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ABSTRACT

In these appendices different aspects of the case study approach to organizational change are covered. A comparison is made between on-site interviews and telephone interviews as methods of data collection. It is concluded that in spite of the great disparity in costs, the use of personal interviews is a necessary method for data collection. Methods used in previous studies of agency innovations confirm this need. Copies of the data collection instruments used in the study, including the guidelines for face-to-face interviewing as well as the instruments for telephone interviews, are provided. Eight studies of innovation developed as a result of fieldwork are presented. For each study the background and nature of the innovation, the current status of routinization, and a review of the possible reasons for routinization status are described. A detailed analysis of responses to telephone interviews for these case studies is provided. Also, four traditional approaches to studying bureaucratic innovation are reviewed. (Author/MC)

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CHANGING URBAN BUREAUCRACIES: HOW NEW PRACTICES BECOME ROUTINIZED—APPENDIXES

PREPARED UNDER A GRANT FROM THE NATIONAL SCIENCE FOUNDATION

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PREFACE

This volume contains a series of appendices related to R-2277-NSF, *Changing Urban Bureaucracies: How New Practices Become Routinized.* Each of the appendices serves as supplementary material to the text, with appendices A-D providing the procedures and raw data cited in Chapter I, and with Appendix E providing a review of the literature cited in Chapter III. The appendices were prepared by the following persons: Appendix A (Robert Yin and Ellen Marks), Appendix B (Ellen Marks), Appendix C (Peter Bateman prepared the case studies on Cincinnati, Dallas, Miami, and San Diego; Suzanne Quick prepared the case studies on Birmingham, Oakland, and Portland; and Robert Yin prepared the case study on Hillsborough County), Appendix D (Ellen Marks), and Appendix E (Robert Yin).

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Appendix A

COMPARISON OF ON-SITE CASE STUDIES WITH TELEPHONE INTERVIEWS

Distinctive Features

There are many well-known differences between telephone and personal interviewing as methods of data collection. The use of telephone interviews fell into great disfavor following the disastrous results of the *Literary Digest* poll in 1936, but the use has increased sharply over the last ten years or so. The use of personal interviews has always been the most common technique for collecting data from households, and it has also been a mainstay of organizational research (Hyman et al., 1954; Festinger and Katz, 1966; and Selltiz et al., 1976). When used in the context of organizational research, personal interviews often form the basis for a case study. However, the data collection method (personal interviews) should not be confused with the research design (an organizational setting as a case study). The discussion that follows focuses on the relative advantages between telephone and personal interviews as methods of data collection.

Most of the comparisons between telephone and personal interviews (and comparisons of both with mail surveys) have dealt with situations in which a *member of a household* is the main respondent. The study of routinization, however, involves members of local service agencies as respondents, and therefore falls into the category of interviewing known as *elite* interviewing (Dexter, 1970). For interviewing agency officials, the major tradeoffs between the two methods have to do with costs, amount of information, and length of interview. For other considerations, such as the accuracy of the information and the response rate, the differences between the two methods appear minimal.

Costs. Mail surveys have always been the least costly method of collecting data; telephone interviews and personal interviews are more costly. One set of comparative cost figures was assembled by Boyd and Westfall (1972) and is reproduced in Table A-1. The table shows that the pattern of cost differences remains the same whether household or elite interviews are involved. Moreover, the costs of the personal interviews will be much higher than those shown in the table if the interviews require trips to several different cities. If a research plan calls for no other consideration than maximizing the number of interviews per unit cost, personal interviews should not be considered as an option. The use of Wide Area Telecommunications Service (WATS) lines in recent years has further reduced telephone costs to the point that the costs of telephone interviews may be quite competitive with those of mail surveys.

Amount of Information. At the same time, personal interviews allow for the collection of the greatest amount of information (Boyd and Westfall, 1972). The personal interview allows for observations of nonverbal behavior, observations of other conditions in an agency, the collection of documents or other artifacts while on the scene, and greater flexibility in asking questions that might be needed to reconcile contradictory responses. Moreover, a single respondent may be inter-

Table A-1

Cost Comparisons for Different Methods of Data Collection, for Households and Elite Respondents

Item	Method of Data Collection				
	Telephone[a]	Mail[b]	Personal[c]	Telephone[d]	Personal[d]
Subject of survey	Health	Unknown	Health	Health	Health
Respondents	General U.S. population	Urban households	Urban households	Doctors	Doctors
Completed questionnaires	456	750	1,298	24	40
Administrative costs	$ 506	$ -	$ 5,900	$ -	$ -
Interviewer costs	584	-	10,700	160	645
Telephone tolls	1,259	-	-	125	-
Mailing expense	-	153	-	-	-
Travel expense	-	-	800	-	-
Inducements	-	493	-	-	-
Miscellaneous costs	275	295	300	-	-
Total costs	$ 2,626	$ 941	$17,700	$ 285	$ 645
Costs per completed interview	$ 5.78	$ 1.25	$ 13.65	$ 11.87	$ 16.12

SOURCE: Harper W. Boyd and Ralph Westfall, *Marketing Research*, 3d ed., Richard D. Irwin, Homewood, Ill., 1972.

[a]Stephen Kegeles, et al., "Interviewing a National Sample by Long-distance Telephone," *Public Opinion Quarterly*, Vol. 33, Fall 1969, pp. 412-419.

[b]Estimated from data in T. R. Wotruba, "Monetary Inducements and Mail Questionnaire Response," *Journal of Marketing Research*, Vol. 3, November 1966, pp. 398-400. Returns were 40 percent of those mailed.

[c]J. R. Hochstim and D. A. Athanasopoulos, "Personal Follow-up in a Mail Survey," *Public Opinion Quarterly*, Vol. 34, Spring 1970, pp. 69-81.

[d]Seymour Sudman, "New Uses of Telephone Methods in Survey Research," *Journal of Marketing Research*, Vol. 3, May 1966, pp. 163-167.

viewed several times, with the interview situation varying from formal to informal settings (Becker and Meyers, 1974). In this regard, the mail survey is the poorest method, but telephone interviews are not much better. Certain kinds of information, covering spatial arrangements, the newness of different equipment, and other critical factors that surround the use of an innovation, simply cannot be obtained over the telephone. Finally, it has been argued that personal interviews, with their concomitant observational opportunities, are more appropriate than telephone interviews where a study tends to be: exploratory, hypothesis-generating rather than hypothesis-confirming, or on a topic of organizational process rather than outcome (e.g., Aberbach et al., 1975); and Eveland, Rogers, and Klepper, 1977.

Length of Interview. Along with additional types of information, the personal interview also has the advantage of yielding much longer interviews. This means that the same questions can often be asked several times or with slightly different words, so that the meaning or consistency of a respondent's answers can be checked. The reverse concern actually exists with telephone iterviews, where elite interviews have tended to be of short duration—10 to 20 minutes (Zamoff et al., 1974; and Wolfson, 1976)—and where even mail surveys may be better suited for long questionnaires (Boyd and Westfall, 1972). Thus, independent of the comparative advantage of personal over telephone interviews in terms of interview length, a secondary question is whether the maximum time for a telephone interview is sufficient.

Accuracy of Information. In contrast to the strong differences in costs, amount of information, and length of interview, there are no major differences in accuracy of information or response rates. One study of responses by physicians found "essentially no differences between the responses of physicians interviewed in person and those interviewed by telephone" (Colombotos, 1969). This general lack of differences has also been found in household surveys (e.g., Hochstim, 1967; and Rogers, 1976), although personal interviews appear to produce slightly greater biases when the interview questions involve the reporting of socially undesirable behavior. Surveys of such issues as abortion, drunken driving, and failure to register to vote, for instance, tend to produce answers of a more socially desirable nature if personal rather than telephone interviews are used, with mail surveys producing the least bias (Wiseman, 1972; and Locander et al., 1974).

Response Rates. There appear to be no major differences between personal and telephone interviews in terms of response rates from elites. For households, too, the differences appear to be diminishing. Traditionally, it has been thought that mail surveys produce much lower response rates than either personal or telephone interviews, and that telephone interviews produce a slightly higher response rate than personel interviews because callbacks are easier to make (e.g., Boyd and Westfall, 1972). However, recent methodological experiments have shown that response rates can be boosted to the point where all three produce fairly similar rates; responses to mail surveys are boosted by prior telephone notification (Wiseman, 1972), and responses to telephone interviews, by a prior letter (Dillman et al., 1976).

Summary. In spite of the great disparity in costs, personal interviewing appears to be a necessary method for collecting data on routinization. This is because:

- The routinization study involves both hypothesis-generation as well as hypothesis-testing;

- Routinization is a complex phenomenon whose study requires a data collection method that yields as much information as possible; and
- Personal interviews allow for on-site observations that provide important clues for understanding the use and nature of an innovation.

Because of the high costs, however, the personal interviews need to be conducted in conjunction with telephone interviews. The telephone interviews can give some indication of the extent to which innovations have been operating in various local agencies, even though the causal links in the routinization process cannot be investigated. In this manner, the information from the telephone interviews provides a broader perspective for the personal interviews and can potentially strengthen the external validity of the sample of personal interviews. Thus, our study of routinization used both methods. Personal interviews and visits were made to a selected group of sites; telephone interviews were made for the unvisited sites (or the bulk of such sites) where the same type of innovation has been used. This use of multiple methods appears to be particularly relevant to studies of organizational structure and change (e.g., Pennings, 1973).

Methods Used in Previous Studies of Agency Innovations

The comparative advantages and disadvantages of mail surveys and personal and telephone interviewing have been reflected by previous studies on innovations by local agencies. In general, the more that a study has focused on organizational processes, the more that the data collection has relied on personal and open-ended interviewing. In contrast, the more that a study has focused on comparisons between characteristics of cities or of organizations, the more that the data collection has relied on mail surveys, telephone interviews, and closed-ended interviewing.

At one extreme, Baer et al. (1976) examined the reasons for success or failure among federal demonstration projects. Neither the full array of reasons nor a definitive measure of success and failure was obvious at the outset of the study. The study therefore consisted of 24 projects, all of which were examined through personal interviews. One group of projects was selected and conducted with an explicit hypothesis-testing objective. The conduct of the study did not follow a uniform set of procedures, so that different types of respondents and questions were used. However, the nature of the demonstration projects was sufficiently diverse that a uniform set of procedures would probably have placed too great a constraint on the collection of the evidence relevant for each case. Nevertheless, despite the diversity of cases and procedures, the Baer et al. study is distinctive because it attempted to aggregate the lessons from the 24 projects according to several rudimentary, nonparametric scales, and the outcome of the study—a fuller understanding of the life of a demonstration project—appeared to justify fully the choice of methods.

A similar type of objective—to develop a new model of organizational innovation—underlies a recent study by Eveland, Rogers, and Klepper (1976). The study focused on the process by which a new computer application, the geocoding of street address files, was implemented by regional agencies and used by local agencies. Again, because the nature of the relevant questions could not be fully known before the research began, the study consisted of eight sets of personal interviews at the regional level, with each set consisting of numerous interviews of regional officials and personnel in the local user agencies.

At the other extreme, Nelson (1975) used the data from closed-ended questionnaires to study the adoption of innovations by local schools. The questionnaires were mailed to school principals, with supporting materials also provided by mail by superintendents and central office administrators. The closed-ended questions were appropriate because the main objective of the study was: (a) to determine the number and type of innovations adopted by each school, and (b) to correlate school and community characteristics with the adoption results. In this type of study, many of the school and community characteristics may be derived from existing records, e.g., census or municipal data, as well as from the mail survey itself. The results of the study involved the identification of the correlates of innovation, thereby following the same general appraoch that we have described elsewhere as the "innovative organizations approach" (see Volume 1 of our study). There are many other studies that have followed the same approach and used the same method. Corwin (1975), for instance, analyzed the correlates of school innovativeness, based on a mail survey to principals of schools employing graduates of the Teacher Corps. In all such studies, the identification of such correlates is only an indirect way of studying the organizational change process, and this remains a limitation of both the approach and the use of mail surveys.

These contrasting uses of methods suggest that there is an inherent tradeoff between the value of having wide-ranging descriptive data, indicating the extent and nature of adoptions by agencies across the country, and the value of having in-depth personal interviews, indicating the possible explanatory factors for the events at a single site. Not surprisingly, several studies have attempted to combine the advantages of both methods. In two different studies (Bingham, 1976; and Feller, Menzel, and Kozak, 1976), mail surveys were first used to determine the extent of adoption of innovations by different local agencies in all major cities (cities of over 50,000 population in the first study and of over 25,000 in the second study). These were closed-ended surveys and generally brief, and additional data were obtained from census and other municipal sources so that cross-city comparisons could be made. Both studies also included, however, a series of personal interviews (with 13 cities and 30 innovations as the subjects of the first study; 20 sites and several manufacturers in the second). The results of these interviews allowed the investigators to gain insight into the innovative process and to interpret the original set of correlative data. The use of multiple methods in these as well as other studies (e.g., Jones et al., 1974) further confirms the relative advantages and disadvantages of the methods. Some topics, e.g., marketing strategies used by manufacturers in promoting an innovation, simply cannot be studied through telephone interviews or mail surveys if the basic process is not well understood at the outset. The simple reliance on intensive personal interviews at a small set of sites, however, fails to provide an adequate perspective for generalizing to a larger number of sites.

Appendix B

DATA COLLECTION INSTRUMENTS

This appendix contains copies of the instruments used in the study. These cover the guidelines for face-to-face interviewing (case studies) as well as the instruments for telephone interviews.

The instruments are grouped in the following manner:

Case Studies

- Site Screening Instruments (telephone calls to determine which sites would be visited) 7
- Guidelines for Site Visits 13

Telephone Interviews

- Methodological Characteristics of the Interview 19
- Instruments for each of the six innovations
  - CAI 21
  - Police Computers 33
  - MICU 45
  - CCTV 58
  - Breath Testing 70
  - Jet-Axe 82

COMPUTER-ASSISTED INSTRUCTION

Site Screening

School District/City: _____ Date of Call: _____

Respondent's Name: _____ Screener: _____

Title: _____

Phone #: _____

1. *Have the schools in your district ever used computer-assisted instruction?*
   Yes _____ No _____
2. *When was computer-assisted instruction first used in your district?* _____(year)
3. *Is computer-assisted instruction still in use?* Yes _____ No _____
   [IF NO] *When was it last used?* _____ (year)
4. *How many of the schools in your district use CAI?*
   _____ of _____ elementary schools
   _____ of _____ junior high schools
   _____ of _____ senior high schools
5. *What classes use CAI?*

Algebra _____	Trigonometry _____	Special Ed _____
Geometry _____	Biology _____	Other (list) _____
Calculus _____	Chemistry _____	Other (list) _____
General Math _____	Language _____	

6. *How many staff are involved in administering the CAI operation?* _____
7. *Has your CAI budget always been as large as it is now?*
   Growing or same _____
   Reduced _____
8. *Does the school district use the same computer for administrative purposes?*
   Yes _____ No _____
   [IF YES] *What administrative functions is it used for?*

Teacher scheduling _____	Payroll _____	Other (list) _____
Grades _____	Reports _____	Other (list) _____

   [IF YES] *When did your school district first use this computer for administrative functions?* _____ (year)

Thank you very much for your help. As I indicated, these are preliminary questions to guide our research. Whom should we contact later if we would like to arrange for a site visit?

_____

POLICE COMPUTERS

Site Screening

Date of Call: _____

Agency Name/City: _____

Respondent Name: _____

Title: _____

Tel. #: _____

1. *Has your department ever used a computer?* Yes _____ No _____
2. *Is the computer still being used?* Yes _____ No _____
3. *When did your department first use a computer?* _____
4. *Is this the same computer that is in use today?* Yes _____ No _____

   (IF YES) *Is the department planning on installing a new computer in the near future?* Yes _____ No _____

   (IF NO) *When was the current computer brought in?* _____
5. *Is the computer owned* _____ *or leased* _____*?*
6. *Does the money to pay for the computer itself come from:*
   department funds _____?
   another city agency _____*?*
   the county _____?
7. *Does the department employ its own computer programmer?* Yes _____ No _____

   (IF YES) *About how large is the computer staff?* _____

   (IF NO) *Who updates the computer programs?* _____
8. *What is the computer used for?*

Administrative		Service	
Attendance	_____	NCIC	_____
Paper processing	_____	Processing the UCR report	_____
Officer performance evaluation	_____	Dispatching officers	_____
Inventory	_____	Traffic control or analysis	_____
Budget analysis	_____	Listing property or M.O.	_____
Other (list)	_____	Case status report	_____
		On-line officer inquiries	_____
		Other (list)	_____

9. *We are also interested in the use of breathalyzers by police departments.*

   a. *Does your department use one?* Yes _____ No _____

      (IF NO) *Has it ever used one?* Yes _____ No _____

   b. *When did the department first use a breathalyzer?* _____

      (IF RESPONDENT UNABLE TO ANSWER, ASK FOR REFERRAL) _____

Thank you very much for your help. As I indicated, these are preliminary questions to guide our research. Whom should we contact later if we would like to arrange for a site visit? _____

MOBILE INTENSIVE CARE UNITS

Site Screening

Agency Name/City: _____ Date of Call: _____

Respondent's Name: _____ Screener: _____

Title: _____

Phone #: _____

1. *Has your department ever used a mobile intensive care unit?* (OTHER ACCEPTABLE TERMS: ADVANCED EMT, CORONARY CARE UNIT, PARAMEDIC)
   Yes____ No____
2. *Is it still in use?* Yes____ No____
   (IF NO) *When was it last used?* _____(year)
3. *When did your city first use a mobile intensive care unit?* _____ (year)
4. *Has this operation always been under [agency's] jurisdiction?*
   Yes____ No____
   (IF NO) *Where was it located before and when did it move to [agency]?*
   _____
5. *How many mobile intensive care units do you have in operation?* _____
   (IF MORE THAN ONE) *When did you acquire the most recent unit?* _____(year)
6. *What are the titles of the personnel who staff the units?*
   How many [title] are there?

Paramedic		Firemen	
EMT-Advanced		Police Officers	
Mobile Intensive Care Personnel		Volunteers	
		Other (list):	

7. *Have the number of units or the number of personnel always been as large as it is now?*
   Number of units grown or same ____ Number of staff grown or same ____
   Number of units decreased ____ Number of staff decreased ____
8. *What prehospital functions are the personnel trained to provide?*

Cardiac defibrillation		Drug administration	
I.V. therapy		Ventilation techniques	
Recognition of cardiac arrhythmias		Basic life support	
ECG transmission		Other (list)	
		Other (list)	

Thank you very much for your help. As I indicated, these are preliminary questions to guide our research. Whom should we contact later if we would like to arrange for a site visit? _____

CLOSED CIRCUIT TELEVISION*

Site Screening

School District/City: _____ Date of Call: _____

Respondent's Name: _____ Screener: _____

Title: _____

Tel. #: _____

1. *Have the schools in your district ever used instructional television?*
   Yes _____ No _____
2. *Can that same program be received in several different classrooms at the same time?* Yes _____ No _____
3. *Does the school district operate the facilities that transmit these programs?*
   Yes _____ No _____

   (IF YES): *When were these facilities first used?* _____(Year)

   How does transmission take place? _____
   (cable, dedicated channel, or other)
4. *What proportion of the schools in your district use the closed circuit system?*

High Schools	Elementary Schools
___0-25%	___0-25%
___26-50%	___26-50%
___over 50%	___ over 50%

5. *Has the number of programs on the closed circuit system always been as large as it is now?*
   _____ YES, number is growing or same
   _____ NO, number has been reduced
6. *We are also interested in the use of computer-assisted instruction by school districts.*

   a. *Does your district use CAI?* Yes _____ No _____

   b. (IF NO): *Has it ever used CAI?* Yes _____ No _____

   When did the schools first use CAI? _____

   (IF RESPONDENT UNABLE TO ANSWER, ASK FOR REFERRAL) _____

Thank you very much for your help. As I indicated, these are preliminary questions to guide our research. Whom should we contact later if we would like to arrange for a site visit?

_____

*Make sure the screener's introduction clearly mentions CCTV, not just educational TV.

BREATH TESTING

Site Screening

Agency Name/City: _____ Date of Call: _____

Respondent's Name: _____ Screener: _____

Title: _____

Tel. #: _____

1. *Has your department ever used a breathalyzer?* Yes _____ No _____

2. *When was it first used?* _____ (year)

3. *Is it still in use?* Yes _____ No _____

   [IF NO] *When was a breathalyzer last used?* _____ (year)

4. *Are any tests performed other than by a breathalyzer to determine blood alcohol concentration?* Yes _____ No _____

   [IF YES] *What else is used?*

   What proportion of suspects stopped for driving under the influence receive [means of test]?

Test	Proportion
Breathalyzer	_____
Urinalysis	_____
Blood test	_____
_____	_____

5. *Do you tend to use breathalyzers as a normal procedure, occasionally, or rarely?*

Normal procedure	_____
Occasionally	_____
Rarely	_____

6. [IF STILL IN USE] *Has the extent of using the breathalyzer grown, declined, or remained the same since it was first used?*

Grown	_____
Declined	_____
Remained the same	_____

7. *Where are your breathalyzers located? How many are at [location]?* [IF PRECINCT STATIONS] *How many precinct stations are in [city]?*

Precinct station	_____
Headquarters	_____
Mobile	_____
_____	_____

Thank you very much for your help. As I indicated, these are preliminary questions to guide our research. Whom should we contact later if we would like to arrange for a site visit?

_____

JET-AXE

Site Screening

Agency Name/City: _____ Date of Call: _____

Respondent's Name: _____ Screener: _____

Title: _____

Phone #: _____

1. *Has your department ever used a jet axe?* Yes _____ No _____

2. *When was it first used?* _____ (year)

3. *Is it still in use?* Yes _____ No _____

   [IF NO] *When was the jet axe last used?* _____ (year)

4. *During the year of its most extensive use, about how many jet axes were used?*

   _____

5. *Do/did you tend to use jet axes as a normal procedure, occasionally, or rarely?*

   Normal procedure _____
   Occasionally _____
   Rarely _____

6. [IF STILL IN USE] *Has the extent of using the jet axe grown, declined, or remained the same since it was first used?*

   Grown _____
   Declined _____
   Same _____

7. *What proportion of the ladder companies use(d) a jet axe?* _____

8. *In your opinion, what is a widely used piece of new hardware that your department has acquired within the past 10 years?*

   _____

   [PROBE] *Has your department ever used hand-held walkie-talkies?*

   Yes _____ No _____

NOTES:

Thank you very much for your help. As I indicated, these are preliminary questions to guide our research. Whom should we contact later if we would like to arrange for a site visit?

_____

GUIDELINES FOR SITE VISITS

The following are simple reminders for our site visit procedures. Also attached is a final set of the topics to be covered by the site visit and to be included in the case study.

1. While on site, keep your eyes open for relevant reports, documents, and artifacts that can be obtained.

2. When the visit is done by a pair of fieldworkers, leave the question of how to divide the write-up until after the site work is completed. (Cases needn't be divided the same way every time.)

3. In writing up the cases, be sure to mention each of the ten hypotheses (marked on the following pages with brackets) even though a hypothesis may have turned out to be irrelevant.

4. In writing up the cases, make the list of informants a separate attachment to the case. Do not use names of individuals in the cases themselves, and avoid attributing specific comments to specific informants.

5. The general order of topics for each case should be:

   I. Background (about 2-3 pages)

   II. Status of Routinization (cover all passages and cycles and use three subtopics as subheads if possible--about 6-8 pages)

   III. Reasons for Routinization Status (cover hypotheses in your priority order of their importance --about 6-8 pages)

I. BACKGROUND

A. NATURE OF THE AGENCY/INNOVATION

1. General structure/function/domain of influence.
2. Number of employees and annual operating budget; budget history including anticipated expansion or cuts.
3. Dominant types of personnel organizations:
   --Civil service
   --Unions
   --"Natural" employee groupings
4. Any salient recent events affecting the agency,
   --e.g., personnel turnover due to elections, restructuring, unusual publicity.
5. Where does the innovation fall within the agency?
   --Who is involved in the day-to-day operation of the innovation (i.e., key personnel and titles--current).
   --How important is the innovation for the day-to-day operation of that subdivision.
6. How did the agency come to use the innovation?
   --Why was it thought to be a good idea?
   --Initial funding?
   --Who was the initiator, main supporter, continued supporters?
   --Was there ever opposition to the innovation?
7. Has the innovation changed at all since it was first introduced? How flexible is the innovation?
8. What hardware/equipment is currently used in the innovation? Which of this is minimally necessary for the innovation to operate?

B. NATURE OF THE COMMUNITY (all information from secondary sources except questions 5 and 6)

1. Population
2. SES and demographic data
3. Local government employees/1000 population
4. Geographic location and type of government
5. Has the community changed much in the last ten years?
6. What are the pressing current problems/concerns/hopes of the agency with respect to community needs?

II. STATUS OF ROUTINIZATION

A. BUDGET AND PURCHASING

1. The annual cost of the innovation in | money / personnel

   --Budget history?

2. Is the budget support | money / personnel part of the regular budget?

   --If so, when and how did it occur?

   --If not, for how many years have requests been made for regular funds or permanent positions?

3. To what extent has equipment been rented or purchased?

   --Significant dates, if purchased.

   --Long-term contracts?

   | If not purchased at time of adoption, why the decision to do so later?

4. If there were budget cuts, would the innovation be treated as a typical agency program, or would it be given special treatment? (Or: are budget decisions pertinent to the innovation made in the same way as budget decisions about other agency programs?)

5. Has the use of the innovation been associated with any reductions in budget for personnel or other agency programs?

   --If so, when did reductions take place?

B. PERSONNEL AND TRAINING

1. How many people are involved full-time only in operating the innovation?

   --Civil service status and position?

   --Are there special job classifications, with own exams? When established?

2. How many practitioners use the innovation as part of their job?

   --A new function? When?

   --New job descriptions?

3. What kind of training program is associated with the use of the innovation?

   --Special vs. ongoing programs

   --Field training versus basic training in service academies

   --When started (and how many cycles)

   --Part of any training manuals?

4. Has the agency brought in any new staff in connection with the innovation whose qualifications or background differed from that of the existing staff?

5. Since the innovation was implemented have any individuals outside the agency ever provided assistance with the innovation?
6. Has the innovation survived a round (how many cycles) of turnover among key personnel or among practitioners who use the innovation?
7. Is there any evidence of formal changes in practitioner certification procedures or performance standards that reflect the use of the innovation?

C. ORGANIZATIONAL GOVERNANCE AND MAINTENANCE

Operations

1. Has the use of the innovation led to specific revisions in operating manuals or organizational forms and paperwork?
2. Is the use of the innovation mandated by:

   --Legislative act or executive order

   --Reference to specific service standards

   --Judicial decisions
3. Does the innovation involve new maintenance or purchasing procedures?

   --Revised purchasing specifications

   --Training and part of maintenance crew's work (internal or external service)
4. Are there any specific old functions that have been replaced by the innovation?

   --If so, how and when was replacement operationally established?
5. Has the use of the innovation been part of any collective bargaining negotiations?
6. Has there been any reorganization of organizational units or sections in order to use the innovation? When?

Equipment

1. Have any aspects of the equipment involved in the innovation changed since it was first introduced?

   --New equipment purchased.

   --Second generation materials (more cycles?)

   --Equipment improvement or redesign (if so, who was involved in the effort?)
2. Has the equipment involved in the innovation been used for any function other than that for which it was originally intended?

III. REASONS FOR ROUTINIZATION STATUS

A. HYPOTHESES (SERVICE APPLICATIONS AND OUTCOMES)

H_1, H_3

1. General function and range of specific applications. Is it a core application?
   - --What services are provided to whom?
   - --Who benefits, directly or indirectly? Any specific measures of service payoffs or improvement?

H_1

2. In what ways is the innovation different from what preceded it?
   - --New function/services
   - --New equipment

   | Another definition of core application

H_3

3. What are the perceived benefits of this innovation?
   - --Who has benefitted most?
   - --Has the innovation created any problems, anticipated or otherwise?

H_2

4. Is there more than one application for which the innovation can be used? If so, how are priorities set and resources shared? Is there evidence of competition among the applications?

B. HYPOTHESES (EXTERNAL ENVIRONMENT)

H_5, H_6

1. Outside the agency and local government, who have been the most enthusiastic supporters of the innovation?

H_5

2. Are the users of the innovation (clients) organized into supporting the innovation?
3. Are there potential clients who serve as a larger pool from which community support is derived?

H_6

4. Who in the community is likely to be aware of innovation?
5. Has there been any publicity about the innovation in recent months?
6. Who in the community benefits most from innovation? Who is likely to support it; oppose it?

H_4

7. Did the use of the innovation begin as a result of:
   - --Crisis condition
   - --Chronic service needs

C. HYPOTHESES (INTERNAL ENVIRONMENT)

h_9, H_{10}
1. Do older personnel teach newer personnel how to use the innovation?
2. Is there apparent resistance or acceptance by practitioners in in using the innovation?
3. Would practitioners now resist removal or dropping of the innovation?

H_{7-9}
4. For those involved, is career advancement and reward a likely positive incentive or irrelevant (or negative)?

H_7
5. To what extent do top agency administrators (e.g., chief, deputy chief, comptroller) support the innovation? How is their support indicated?

H_8
6. To what extent has there been an active innovator who:
   --Coordinates activities
   --Can make repairs if necessary
   --Seeks to institutionalize the use of the innovation

H_{10}
7. Are there any groups within the local agency or government who oppose the innovation (and who might support some other innovation)?

Keypuncher: Go to new card--punch 6 in col. 1, duplicate cols. 2-10

METHODOLOGICAL CHARACTERISTICS OF THE INTERVIEW

1. Interviewer _____ [ ] 11/

2. Date(s) of interview _____ [ ][ ][ ][ ][ ][ ] 12-17/

3. What is the respondent's relationship to the innovation? 18/

Director of innovation	1
Assistant to director of innovation	2
Staff person who knew most about innovation	3
Only person in department who knew about innovation	4
Other (list) _____	5

4. What was the length of the interview? Minutes [ ][ ][ ] 19-21/

5. What was the respondent's attitude toward the interview? 22/

Friendly	1
Accepting	2
Indifferent	3
Hostile	4
No response	9

6. Did the respondent appear willing to talk at greater length? 23/

Yes	1
No	2
No response	9

7. After contacting the respondent, was it necessary to set up an appointment to conduct the interview at a later date? 24/

Yes	1
No	2

8. Was the interview interrupted and completed at a later time? 25/

Yes...(ANSWER Q.9A)	1
No	2

8A. Why? _____ [ ] 26/
_____

9. Was more than one respondent interviewed? 27/

Yes...(ANSWER Q.10A)	1
No	2

9A. Why? _____ [ ] 28/
_____

10. Did the respondent voluntarily offer the names of other people with whom we might wish to speak?

Yes	1	*29/*
No	2	
No response	9	

11. What appeared to be the extent of the respondent's knowledge of the innovation?

Knowledgeable	1	*30/*
Somewhat informed	2	
Not well informed	3	
No response	9	

12. Did the respondent ask for Rand to clear the interview with his superior?

Yes	1	*31/*
No	2	

13. Did the respondent request confidentiality?

Yes	1	*32/*
No	2	

14. What was the cost of this interview, including preliminary telephone calls?

				33-36/

COMPUTER-ASSISTED INSTRUCTION

City and State _____

Respondent's Name _____

Title _____

Telephone Number _____

Interview Dates _____

Secondary Respondent's Name _____

Title _____

Telephone Number _____

Appointment set for (day) _____

(time) _____ (with) _____

If School District was called previously for any innovation:

Respondent's Name _____

Title _____

Telephone Number _____

Date of Call _____

Innovation _____

Rand Screeners _____

A. EQUIPMENT

____ 1. *Has your district ever had its own computer that included instructional applications?* [PROBE WITH FIRST FIVE APPLICATIONS ON P. 5]

Yes	1	*11/*
No	2	
No response	9	

____ 2. *How is the computer operation administered?*

School district alone	1	*12/*
School district and other agency	2	
Other agency, with school district consulted as users (name agency) _____	3	
No response	9	

____ 3. *Are there any full-time computer operators on the school district staff?*

Yes	1	*13/*
No	2	
No response	9	

IF Q.1 = 2,9; OR Q.2 = 3,9; AND Q.3 = 2,9, GO TO Q.46, THEN TERMINATE INTERVIEW.

____ 4. *Have you ever had more than one computer for instructional purposes?*

Yes...(GO TO Q.4A AND 4B)	1	*14/*
No...(GO TO Q.4A ONLY)	2	
No response	9	

____ 4A. *Please name the computer (core) model(s).*
[IF ONE ONLY, GO TO Q.5; NOTE "NOT SURE" RESPONSES WITH ASTERISK]

#1 (list) _____ *15/*

#2 (list) _____

#3 (list) _____

____ 4B. *Which of these models has served the most students over time?*
[THIS IS THE FOCUS FOR ALL REMAINING QUESTIONS]

Fill in number from Q.4A (1,2, or 3) ☐ *16/*

____ 5. *Is the computer still in use?*

Yes	1	*17/*
No...(GO TO Q.5A)	2	
No response	9	

____ 5A. *What was the last year it was used?*
[ENTER TWO-DIGIT YEAR; ENTER 99 IF NO RESPONSE]

Year ☐☐ *18-19/*

____ 6. *How many models of core computers preceded this one?*
[ENTER NUMBER OF MODELS; ENTER 9 IF NO RESPONSE]

models preceding current one ☐ *20/*

____ 7. *What year was the first core computer used?*
[ENTER TWO-DIGIT YEAR; ENTER 99 IF NO RESPONSE]

Year ☐☐ *21-22/*

____ 8. *How many on-line terminals are connected to this computer?*
[ENTER THREE-DIGIT NUMBER; ENTER 999 IF NO RESPONSE]

terminals ☐☐☐ *23-25/*

____ 8A. *How many of these terminals are used for instructional applications?*
[ENTER THREE-DIGIT NUMBER; ENTER 999 IF NO RESPONSE]

terminals ☐☐☐ *26-28/*

____ 9. *Is the core computer purchased, leased, or on a lease-purchase option?*

Purchased...(ANSWER Q.9A).....	1	*29/*
Leased...(ANSWER Q.10).....	2	
Lease-purchase...(GO TO Q.11).....	3	
Other (list)_____	4	
No response...(GO TO Q.11).....	9	

____ 9A. *When was this core computer purchased?*
[ENTER TWO-DIGIT YEAR; ENTER 99 IF NO RESPONSE]

Year ☐☐ *30-31/*

____10. *How many years is the lease for?*
[ENTER ONE DIGIT; ENTER 9 IF NO RESPONSE]

# of years ☐ *32/*

____11. *Is there a service contract for repair and maintenance of the computer?*

[IF YES] *With whom?*

[IF NO] *Who provides repair and maintenance?*

Yes, contract with manufacturer.....	1	*33/*
Yes, contract with other outside.... group (list)_____	2	
Yes, no response for by whom.....	3	
No, service provided by district....	4	
No, service provided by other agency (list)_____	5	
No, no response for by whom.....	6	
No response.....	9	

___12. *Was there any technical assistance from outside the district in order to begin the computer-assisted instructional applications?*

[IF YES] *From what source?*

Yes, manufacturer	1	34/
Yes, other education agency	2	
Yes, local university	3	
Yes, other (list)	4	
Yes, combination (list)_____	5	
No	6	
No response	9	

___13. *Has there been any continuing technical assistance from outside the district for the computer-assisted instructional applications?*

[IF YES] *From what source?*

Yes, manufacturer	1	35/
Yes, other education agency	2	
Yes, local university	3	
Yes, other (list)_____	4	
Yes, combination (list)_____	5	
No	6	
No response	9	

B. SERVICES

USE THE FOLLOWING CHART FOR QUESTIONS 14-19; NOTE "NOT SURE" RESPONSES BY PLACING ASTERISK IN BOX WITH CHECK MARK.

14. *What are the main applications or functions of the computer operation?* [PROBE WITH LIST]

15. *What year was (application) first performed by a computer?*

16. *Of these applications, were any not performed before the computer operation began?*

[IF YES] *Which ones?*

17. *If the computer could not be used for a week, which of the applications could not be performed any other way?*

18. *Of the applications that the computer provides, which are the top three that are responsible for most of the operating time of the core computer?*

19. *Have there been any problems in setting priorities among different applications because of limitations on computer time or capacity?*

[IF YES] *Which applications?*

[IF YES] *How has the department dealt with such problems?* (list)

_____

_____

ENTER 1 IF YES, IF NO, 9 IN NO RESPONSE FOR ALL QUESTIONS EXCEPT Q.15; FOR Q.15, ENTER TWO-DIGIT YEAR OR 99 IF NO RESPONSE; NOTE "NOT SURE" RESPONSES BY PLACING ASTERISK IN BOX NEXT TO ENTERED NUMBER.

APPLICATION	Q.14	Q.15	Q.16	Q.17	Q.18	Q.19	
Computer math courses							*36-42/*
Programming in regular math							*43-49/*
CAI for all students in regular courses							*50-56/*
Special projects for advanced students							*57-63/*
Remedial practice							*64-70/*

Keypuncher: Go to new card--punch 2 in col. 1, duplicate cols. 2-10.

Other:							*11-17/*
Other:							*18-24/*
Other:							*25-31/*
Student scheduling							*32-38/*
Test scoring, evaluations, or research							*39-45/*
Grade reporting							*46-52/*

Keypuncher: Go to new card--punch 3 in col. 1, duplicate cols. 2-10.

Budget or accounts							*11-17/*
Payroll							*18-24/*
School personnel							*25-31/*
Student records							*32-38/*
Property inventory							*39-45/*
Other:							*46-52/*
Other:							*53-59/*

C. STAFF AND ADMINISTRATION

USE FOLLOWING CHART FOR QUESTIONS 20-22; NOTE "NOT SURE" RESPONSES BY PLACING ASTERISK TO RIGHT OF CIRCLED NUMBER.

20. *Does the district have (personnel) associated with the computer-assisted instructional applications in its current budget?*

    [IF YES] *How many full-time equivalent (personnel) are there?* [ENTER TWO-DIGIT NUMBER; ENTER 99 IF NO RESPONSE]

    [IF NO, ENTER 00]

21. *Is (personnel) a <u>permanent</u> position in the district's budget?*

22. *Does the specific civil service or other official personnel classification include CAI-qualifications for (personnel)?*

Keypuncher: Go to new card--punch 4 in col. 1, duplicate cols. 2-10.

Personnel	Q.20 # FTE?	Q.21 POSITION PERMANENT? Yes	No	No Response	Q.22 CLASSIFICATION? Yes	No	No Response	
General Coordinator		1	2	9	1	2	9	*11-14/*
Curriculum Supervisor (any subject)		1	2	9	1	2	9	*15-18/*
Teaching Staff		1	2	9	1	2	9	*19-22/*
Other: (list)		1	2	9	1	2	9	*23-26/*
Other: (list)		1	2	9	1	2	9	*27-30/*

____23. *For the teaching staff, what kind of <u>formal</u> computer training is routinely provided by the district?*

Informal assistance.....	1	*31/*
Special classes run by district.....	2	
Classes at local college or manufacturer.....	3	
Other (list)_____	4	
Combination (list)_____	5	
None...(GO TO Q.25).....	6	
No response...(GO TO Q.25).....	9	

____24. *What proportion of the eligible teaching staff has participated in this training?*

Most or all	1	32/
About half	2	
Few or a small minority	3	
None	4	
No response	9	

____25. *In order for a new teacher to qualify for computer-assisted instruction subjects, must he or she have had formal computer training?*

Yes	1	33/
No	2	
No response	9	

____26. *How many individuals have filled the coordinator position, including the present one?*
[ENTER TWO-DIGIT NUMBER; ENTER 99 IF NO RESPONSE]

coordinators ☐☐ 34-35/

[IF MORE THAN ONE] *What position does the previous coordinator now hold?* (list) _____ ☐ 36/

____27. *Was the coordinator ever a teacher in the district and what position does the coordinator have?* [PROBE WITH LIST]

Not teacher, in data processing unit	1	37/
Yes, teacher, in data processing unit	2	
Yes, teacher, in curriculum department	3	
Other (list)_____	4	
No response	9	

____28. *Does any member of the curriculum (instructional) department assist in the CAI operation?* [PROBE WITH LIST]

Serves as main coordinator	1	38/
Collaborates with data processing unit in coordinating computer use	2	
Other (list)_____	3	
Combination (list)_____	4	
None	5	
No response	9	

____29. *Who was responsible for first introducing computer-assisted instruction into the district?*

Superintendent...(ANSWER Q.29A).....	1	*39/*
Staff person within data processing unit (ANSWER Q.29A).....	2	
Staff person within curriculum department...(ANSWER Q.29A).....	3	
Person outside district.....	4	
Group of persons (e.g., city council, agency consortium).....	5	
Combination of above (list) _____	6	
Other (list)_____	7	
No response.....	9	

____ 29A. *Is this person still with the district?*

Yes...(ANSWER Q.29B).....	1	*40/*
No.....	2	
No response.....	9	

____ 29B. *In what position?* (list)_____ *41/*

____30. *Why was computer-assisted instruction initiated?*

Growing demands from teachers or students.....	1	*42/*
Rising enrollment.....	2	
Specific need or crisis (list) _____	3	
All of above.....	4	
Combination of above (list)_____	5	
Other (list)_____	6	
No response.....	9	

____31. *What is the source of most of the software used for instructional applications?*

Own programming staff within district	1	*43/*
Programming staff in other city agency.....	2	
Consultants or external programmers.	3	
Prepackaged programs.....	4	
Students or teachers in the district	5	
Other (list)_____	6	
No response.....	9	

____32. *Where do most of the operating funds for CAI come from?*
[USE LIST AS PROBE]

Regular part of district budget	1	44/
Some other part of municipal budget	2	
Federal grants or funds	3	
Special bond issue or other levy	4	
State grants or funds	5	
Combination (list)_____	6	
Other (list)_____	7	
No response	9	

____33. *Were there ever any federal, state, or foundation funds used to support CAI?*

Yes, federal	1	45/
Yes, state	2	
Yes, foundation	3	
Yes, combination (list)_____	4	
No...(GO TO Q.34)	5	
No response	9	

33A. *Where did these funds come from?* [ENTER 9 IF NO RESPONSE]

33B. *During what years?* [ENTER 99-99 IF NO RESPONSE]

33C. *What was the amount?* [ENTER 99 IF NO RESPONSE; MAY ROUND TO NEAREST $100,000 OR LIST RANGE]

[PLACE ASTERISK NEXT TO ANY "NOT SURE" RESPONSE]

Source	Years	Amount		
_____	_____	_____	☐☐☐☐☐☐☐	46-52/
_____	_____	_____	☐☐☐☐☐☐☐	53-59/
_____	_____	_____	☐☐☐☐☐☐☐	60-66/

Keypuncher: Go to new card--punch 5 in col. 1, duplicate cols. 2-10.

34. *What was the annual budget for CAI during 1976, excluding personnel and salaries? 1975? 1974?*
[ENTER AMOUNT; ENTER 999 IF NO RESPONSE; MAY ROUND TO NEAREST $100,000 OR LIST RANGE; NOTE "NOT SURE" RESPONSE WITH ASTERISK]

1976 _____	☐☐☐☐	11-14/
1975 _____	☐☐☐☐	15-18/
1974 _____	☐☐☐☐	19-22/

____35. *Have any changes in textbook adoptions been made due to the use of CAI?* [USE HIGHEST]

New texts with CAI sections for all relevant classes	1	23/
New texts with CAI sections for some classes	2	
Supplementary CAI materials	3	
Texts for special computer courses	4	
None	5	
Other (list)_____	6	
No response	9	

____36. *Are there any state or local laws or regulations that call for the existence of CAI?*

Yes (list)_____	1	24/
No	2	
No response	9	

____37. *Are any of the instructional applications of the computer linked to some state or local law or regulation?*

Yes (list)_____	1	25/
No	2	
No response	9	

D. INTERNAL FACTORS

USE FOLLOWING CHART FOR QUESTION 38; NOTE "NOT SURE" RESPONSES BY PLACING ASTERISK TO RIGHT OF CIRCLED NUMBER.

38. *To what extent do teachers in different subjects use CAI?*

Subject	Most	Few	None	No Response	
Math	1	2	3	9	26/
Reading	1	2	3	9	27/
Chemistry	1	2	3	9	28/
Biology	1	2	3	9	29/
Social Science	1	2	3	9	30/
Other:	1	2	3	9	31/

____39. *Are the CAI terminals used in a classroom while class is in progress?*

Yes, more than one terminal	1	32/
Yes, usually one terminal only	2	
No, special time or classroom for terminals	3	
No response	9	

____40. *Is the amount of available terminal time about right to serve student demands?*

Yes	1	33/
No, some terminal time is unused	2	
No, more time is in continual demand	3	
No, more time is in continual demand and there is a formal waiting list	4	
No response	9	

____41. *Have any service benefits from the instructional applications been recognized?*

Yes...(ANSWER Q.41A)	1	34/
No	2	
No response	9	

____ 41A. *How have these service benefits been recognized--reported in the budget, discussed in budget justifications, special studies or evaluations, or some other way?*

Specific savings or efficiencies reported in budget	1	35/
Specific savings or efficiencies discussed in budget justifications	2	
Special studies or evaluations	3	
Combination of above (list) _____	4	
Other (list) _____	5	
None of above...(GO TO Q.42)	6	
No response...(GO TO Q.42)	9	

____ 41B. *What is one example of a service benefit?* (list) 36/

_____

_____

____42. *In your opinion, has there been resistance of any sort by district personnel in using the computer for instructional applications?*

Yes...(ANSWER Q.42A)	1	37/
No	2	
No response	9	

____ 42A. *What was the nature of the resistance?*

Over specific applications only	1	38/
Over initial adoption	2	
Over use of the entire system	3	
Other (list) _____	4	
Combination (list) _____	5	
No response	9	

E. EXTERNAL FACTORS

___43. *Has there been any publicity regarding the instructional applications?*

Yes, local media or press.....	1	39/
Yes, national media or press.....	2	
Yes, both.....	3	
No...(GO TO Q.44).....	4	
No response...(GO TO Q.44).....	9	

___ 43A. *Has the publicity generally been favorable, mixed, or unfavorable?*

Favorable.....	1	40/
Mixed.....	2	
Unfavorable.....	3	
No response.....	9	

USE FOLLOWING CHART FOR QUESTIONS 44-45; NOTE "NOT SURE" RESPONSES BY PLACING ASTERISK TO RIGHT OF CIRCLED NUMBER.

44. *Have there been any active supporters of the instructional applications outside of the school district?*

45. *Have there been any active opposers of the instructional applications outside of the school district?*

	Q.44 SUPPORTERS OR USERS			Q.45 OPPOSERS			
Activists	Yes	No	No Response	Yes	No	No Response	
Municipal executive	1	2	9	1	2	9	41-42/
Other municipal officers	1	2	9	1	2	9	43-44/
Local legislators	1	2	9	1	2	9	45-46/
Citizen groups	1	2	9	1	2	9	47-48/
Parents	1	2	9	1	2	9	49-50/
Other:	1	2	9	1	2	9	51-52/

___46. *In the next year or so, do you see any difficulties affecting the overall instructional applications other than budget?*

Yes...(ANSWER Q.46A).....	1	53/
No.....	2	
No response.....	9	

___ 46A. *What are these difficulties?* (list) 54/

_____

_____

POLICE COMPUTERS

City and State _____

Respondent's Name _____
Title _____
Telephone Number _____
Interview Dates _____

Secondary Respondent's Name _____
Title _____
Telephone Number _____

Appointment set for (day) _____
(time) _____ (with) _____

If Police Department was called previously for any innovation:

Respondent's Name _____
Title _____
Telephone Number _____
Date of Call _____
Innovation _____
Rand Screeners _____

A. EQUIPMENT

____ 1. *Does your department currently have its own computer?* [A MACHINE REQUIRING PROGRAMMING, NOT JUST ADP]

Yes...(GO TO Q.2)..... 1 *11/*
No..... 2
No response..... 9

____ 1A. *Did it ever have its own computer?*

Yes..... 1 *12/*
No..... 2
No response..... 9

____ 2. *How is the computer operation administered?*

Police department alone..... 1 *13/*
Police department and other agency..... 2
Other agency, with police department consulted as users (name agency _____)..... 3
No response..... 9

____ 3. *Are there any full-time computer operators on the Police Department staff?*

Yes..... 1 *14/*
No..... 2
No response..... 9

____ 4. *What model computer (core) do you use today?*

#1 (list) _____

#2 (list) _____

IF ALL ANSWERS ARE NEGATIVE--i.e., Q.1 = 2,9; Q.1A = 2,9; Q.2 = 3,9; Q.3 = 2,9; or if Q.4 = non-computer--GO TO Q.47, THEN TERMINATE INTERVIEW.

____ 5. *How many models of core computers have preceded the current one?* [ENTER NUMBER OF MODELS; ENTER 9 IF NO RESPONSE]

models preceding current one ☐ *15/*

____ 6. *What year was the first core computer used?* [ENTER TWO-DIGIT YEAR; ENTER 99 IF NO RESPONSE]

Year ☐☐ *16-17/*

____ 7. *How many on-line terminals are now located within the department?* [ENTER THREE-DIGIT NUMBER; ENTER 999 IF NO RESPONSE]

terminals ☐☐☐ *18-20/*

____ 8. *Is the core computer currently purchased, leased, or on a lease-purchase option?*

Purchased...(ANSWER Q.8.A).....	1	21/
Leased...(ANSWER Q.9).....	2	
Lease-purchase...(GO TO Q.10).....	3	
Other (list) _____	4	
No response...(GO TO Q.10).....	9	

____ 8A. *When was this core computer purchased?*
[ENTER TWO-DIGIT YEAR; ENTER 99 IF NO RESPONSE]

Year ☐☐ 22-23/

____ 9. *How many years is the lease for?*
[ENTER ONE DIGIT; ENTER 9 IF NO RESPONSE]

# of years ☐ 24/

____10. *Was there any technical assistance from outside the department in order to begin the computer operation?*

[IF YES] *From what source?*

Yes, manufacturer.....	1	25/
Yes, other law enforcement agency.....	2	
Yes, local university.....	3	
Yes, other (list)_____	4	
Yes, combination (list)_____	5	
No...(GO TO Q.12).....	6	
No response.....	9	

____11. *Did any of the individuals who provided this assistance become employees of the Police Department?*

Yes.....	1	26/
No.....	2	
No response.....	9	

____12. *Has there been any <u>continuing</u> technical assistance from outside the department in operating the computer?*

[IF YES] *From what source?*

Yes, manufacturer.....	1	27/
Yes, other law enforcement agency.....	2	
Yes, local university.....	3	
Yes, other (list)_____	4	
Yes, combination (list)_____	5	
No.....	6	
No response.....	9	

____13. *Is there a service contract for repair and maintenance of the computer?*

[IF YES] *With whom?*

[IF NO] *Who provides repair and maintenance?*

Yes, contract with manufacturer.....	1	28/
Yes, contract with other outside group (list)_____	2	
Yes, no response for by whom.....	3	
No, service provided by department.....	4	
No, service provided by other agency (list)_____	5	
No, no response for by whom.....	6	
No response.....	9	

B. SERVICES

USE FOLLOWING CHART FOR QUESTIONS 14-21; NOTE "NOT SURE" RESPONSES BY PLACING ASTERISK IN BOX WITH CHECK MARK.

14. *What are the main applications or functions of the computer operation?* [PROBE WITH LIST]

15. *What year was (application) first performed by a computer?*

16. *Of these applications, were any <u>not</u> performed before the computer operation began?*

    [IF YES] *Which ones?*

17. *If the computer could not be used for a week, which of the applications could <u>not</u> be performed <u>any</u> other way?*

18. *Of the applications that the computer provides, which are the top three that are responsible for most of the operating time of the core computer?*

19. *Have there been any problems in setting priorities among different applications because of limitations on computer time or capacity?*

    [IF YES] *Which applications?*

    [IF YES] *How has the department dealt with such problems?* (list)

    _____

    _____

20. *Are there any applications that were once tried or used that are no longer part of the computer operation?*

    [IF YES] *Which applications?*

    [IF YES] *What are the main reasons that these applications are no longer part of the computer operation?* (list)

    _____

    _____

21. *In your opinion, if there were severe budget cutbacks, which applications would probably have to be discontinued?*

CODING FORM FOR QUESTIONS 14-21

ENTER 1 IF YES, 2 IF NO, 9 IF NO RESPONSE FOR ALL QUESTIONS EXCEPT Q.15; FOR Q.15, ENTER TWO-DIGIT YEAR OR 99 IF NO RESPONSE; NOTE "NOT SURE" RESPONSES BY PLACING ASTERISK IN BOX NEXT TO ENTERED NUMBER.

APPLICATION	Q.14	Q.15	Q.16	Q.17	Q.18	Q.19	Q.20	Q.21	
UCR									29-37/
Payroll									38-46/
Personnel									47-55/
Inventory									56-64/
Budget or accounts									65-73/

Keypuncher: Go to new card--punch 2 in col. 1, duplicate cols. 2-10.

Other:									11-19/
Other:									20-28/
Other:									29-37/
Dispatching									38-46/
Case entry									47-55/
Traffic									56-64/

Keypuncher: Go to new card--punch 3 in col. 1, duplicate cols. 2-10.

Crime analysis									11-19/
Search for plates									20-28/
Search for stolen property									29-37/
Warrants									38-46/
Other:									47-55/
Other:									56-64/
Other:									65-73/

C. STAFF AND ADMINISTRATION

USE FOLLOWING CHART FOR QUESTIONS 22-24; NOTE "NOT SURE" RESPONSES BY PLACING ASTERISK TO RIGHT OF CIRCLED NUMBER.

22. *Does the department have (personnel) associated with operating the computer in its current budget?*

    [IF YES] *How many full-time equivalent (personnel) are there?* [ENTER TWO-DIGIT NUMBER; ENTER 99 IF NO RESPONSE]

    [IF NO, ENTER 00]

23. *Is (personnel) a <u>permanent</u> position in the department's budget?*

24. *Is there a specific civil service or other official personnel classification for (personnel)?*

Keypuncher: Go to new card--punch 4 in col. 1, duplicate cols. 2-10.

Personnel	Q.22 NUMBER FTE?	Q.23 POSITION PERMANENT? Yes	No	No Response	Q.24 CLASSIFICATION Yes	No	No Response	
Coordinator		1	2	9	1	2	9	*11-14/*
Programmer		1	2	9	1	2	9	*15-18/*
Clerical		1	2	9	1	2	9	*19-22/*
Other (list)		1	2	9	1	2	9	*23-26/*
Other (list)		1	2	9	1	2	9	*27-30/*

[SKIP Q.25 IF THERE ARE NO PROGRAMMERS IN DEPARTMENT]

____25. *For new programmers, what kind of <u>formal</u> computer training is routinely provided by the department?*

Special training sessions by manufacturer	1	*31/*
Formal training classes run by department	2	
Training in police academy	3	
Other (list)_____	4	
Combination (list)_____	5	
None	6	
No response	9	

____26. *In order for a person to qualify as a programmer in this department, must he or she pass an exam?*

____27. [IS YES] *What agency gives the exam?*
[PROBE TO DETERMINE IF CIVIL SERVICE]

Yes, civil service	1	32/
Yes, test by Department	2	
Yes, test by other agency (name agency)_____	3	
Yes, combination (list)_____	4	
No	5	
No response	9	

____28. *How many individuals have filled the coordinator position, including the present one?*
[ENTER TWO-DIGIT NUMBER; ENTER 99 IF NO RESPONSE]

coordinators ☐☐ *36-37/*

[IF MORE THAN ONE] *What position does the previous coordinator now hold?* (list) _____ ☐ *38/*

____29. *Who was responsible for first introducing the computer into the department?*

Chief of Department.(ANSWER Q.29A)	1	39/
Staff person within department... (ANSWER Q.29A)	2	
Staff person in other agency (give position)_____	3	
Person outside city government...	4	
Group of persons (e.g., city council, agency consortium)	5	
Combination of above (list) _____	6	
Other (list)_____	7	
No response	9	

____ 29A. *Is this person still with the department?*

Yes...(ANSWER Q.29B)	1	40/
No	2	
No response	9	

____ 29B. *In what position?*

(list) _____ ☐ *41/*

____30. *Why was the computer operation initiated?*

Growing demands for recordkeeping	1	42/
Rising incidence of crime	2	
Specific need or crisis (list) _____	3	
All of the above	4	
Combination of above (list) _____	5	
Other (list)_____	6	
No response	9	

____31. *What is the source of most of the software used by the computer operation?*

Own programming staff within department	1	43/
Programming staff in other city agency	2	
Consultants or external programmers	3	
Prepackaged programs	4	
Other (list)_____	5	
No response	9	

____32. *Where do most of the operating funds for the computer come from?* [USE LIST AS PROBE]

Regular part of Department budget	1	44/
Some other part of municipal budget	2	
Federal grants or funds	3	
Special bond issue or other levy	4	
State grants or funds	5	
Combination (list)_____	6	
Other (list)_____	7	
No response	9	

____33. *Within the police department's organization, is the computer operation a separate section or part of another section?*

Separate section	1	45/
Part of another section (list) _____	2	
Other (list)_____	3	
No response	9	

____34. *Were there ever any federal, state, or foundation funds used to support the computer operation?*

Yes, federal	1	46/
Yes, state	2	
Yes, foundation	3	
Yes, combination (list)_____	4	
No...(GO TO Q.35)	5	
No response	9	

34A. *Where did these funds come from?* [ENTER 9 IF NO RESPONSE]

34B. *During what years?* [ENTER 99-99 IF NO RESPONSE]

34C. *What was the amount?* [ENTER 99 IF NO RESPONSE; MAY ROUND TO NEAREST $100,000 OR LIST RANGE]

[PLACE ASTERISK NEXT TO ANY "NOT SURE" RESPONSE]

Source	Years	Amount		
_____	_____	_____		47-53/
_____	_____	_____		54-60/
_____	_____	_____		61-67/

Keypuncher: Go to new card--punch 5 in col. 1, duplicate cols. 2-10.

35. *What was the annual budget for the computer operation during 1976, excluding personnel and salaries? 1975? 1974?*
[ENTER AMOUNT; ENTER 999 IF NO RESPONSE; MAY ROUND TO NEAREST $100,000 OR LIST RANGE; NOTE "NOT SURE" RESPONSE WITH ASTERISK]

1976 _____ ☐☐☐☐ *11-14/*

1975 _____ ☐☐☐☐ *15-18/*

1974 _____ ☐☐☐☐ *19-22/*

____36. *What formal changes in organizational procedures have been made due to the use of the computer?*

Creation of new organizational units	1	*23/*
Creation of new forms for reporting information to the computer.... (ANSWER Q. 36A)	2	
Both...(ANSWER Q.36A)	3	
Neither	4	
Other (list)_____	5	
No response	9	

36A. *Are any of the old forms still available?*

They never existed	1	*24/*
They are still available in the department	2	
They are still available outside the department	3	
They are no longer available	4	
No response	9	

____37. *Are there any state or local laws or regulations that call for the existence of the computer operation?*

Yes (list)_____	1	*25/*
No	2	
No response	9	

____38. *Are any of the services the computer provides called for by some state or local law or regulations?*

Yes (list)_____	1	*26/*
No	2	
No response	9	

D. INTERNAL FACTORS

USE FOLLOWING CHART FOR QUESTIONS 39-40; NOTE "NOT SURE" RESPONSES BY PLACING ASTERISK TO RIGHT OF CIRCLED NUMBER.

39. *Does (personnel) use the computer's printouts on a regular basis?*

40. *Does (personnel) use the computer on-line on a regular basis?*

Personnel	Q.39 USES PRINTOUTS? Yes	No	No Response	Q.40 USES ON-LINE? Yes	No	No Response	
Top Administrators	1	2	9	1	2	9	*27-28/*
Police supervisors	1	2	9	1	2	9	*29-30/*
Dispatching staff	1	2	9	1	2	9	*31-32/*
Officers on the street, excluding traffic	1	2	9	1	2	9	*33-34/*
Other:	1	2	9	1	2	9	*35-36/*
Other:	1	2	9	1	2	9	*37-38/*

___41. *What kind of computer training does the department provide for any police officers who are users?*

On the job only...(ANSWER Q.41A)... 1 *39/*
Some special classes..... 2
Some class offered by police academy..... 3
Other (list)_____ 4
No training..... 5
No response..... 9

___ 41A. *If a user were to leave, who is responsible for training his replacement?*

Employee being replaced..... 1 *40/*
Employee's supervisor..... 2
Computer operations staff, providing some on the job training.... 3
Other (list)_____ 4
No one..... 5
No response..... 9

____42. *Have any service benefits from the computer been recognized?*

Yes...(ANSWER Q.42A).....	1	41/
No.....	2	
No response.....	9	

____ 42A. *How have these service benefits been recognized--reported in the budget, discussed in budget justifications, special studies or evaluations, or some other way?*

Specific savings or efficiencies reported in budget.....	1	42/
Specific savings or efficiencies discussed in budget justifications.	2	
Special studies or evaluations.....	3	
Combination of above (list) _____	4	
Other (list)_____	5	
None of above...(GO TO Q.43).....	6	
No response...(GO TO Q.43).....	9	

____ 42B. *What is one example of a service benefit?* (list) 43/

_____

_____

____43. *In your opinion, has there been resistance of <u>any</u> sort by departmental personnel in using the computer?*

Yes...(ANSWER Q.43A).....	1	44/
No.....	2	
No response.....	9	

____ 43A. *What was the nature of the resistance?*

Over specific applications only....	1	45/
Over initial adoption.....	2	
Over use of the entire system.....	3	
Other (list)_____	4	
Combination (list)_____	5	
No response.....	9	

E. EXTERNAL FACTORS

____44. *Has there been any publicity regarding the department's computer?*

Yes, local media or press	1	46/
Yes, national media or press	2	
Yes, both	3	
No...(GO TO Q.45)	4	
No response...(GO TO Q.45)	9	

____ 44A. *Has the publicity generally been favorable, mixed, or unfavorable?*

Favorable	1	47/
Mixed	2	
Unfavorable	3	
No response	9	

USE FOLLOWING CHART FOR QUESTIONS 45-46; NOTE "NOT SURE" RESPONSES BY PLACING ASTERISK TO RIGHT OF CIRCLED NUMBER

45. *Have there been any active supporters or users of the computer outside of the Police Department?* [USE LIST AS PROBE]

46. *Have there been any active opposers of the computer outside of the Police Department?* [USE LIST AS PROBE]

	Q.45 SUPPORTERS OR USERS			Q.46 OPPOSERS			
Activists	Yes	No	No Response	Yes	No	No Response	
Municipal executive	1	2	9	1	2	9	48-49/
Other municipal officers	1	2	9	1	2	9	50-51/
Local legislators	1	2	9	1	2	9	52-53/
Citizen groups	1	2	9	1	2	9	54-55/
Other:	1	2	9	1	2	9	56-57/

____47. *In the next year or so, do you see any difficulties affecting the computer operation other than budget?*

Yes...(ANSWER Q.47A)	1	58/
No	2	
No response	9	

____ 47A. *What are these difficulties?* (list) 59/

MOBILE INTENSIVE CARE UNITS

City and State _____

Respondent's Name _____

Title _____

Telephone Number _____

Interview Dates _____

Secondary Respondent's Name _____

Title _____

Telephone Number _____

Appointment set for (day) _____

(time) _____ (with) _____

If Fire Department was called previously for any innovation:

Respondent's Name _____

Title _____

Telephone Number _____

Date of Call _____

Innovation _____

Rand Screeners _____

A. EQUIPMENT

____ 1. *Does your department currently have a mobile intensive care unit?*

Yes...(GO TO Q.2).....	1	*11/*
No.....	2	
No response.....	9	

____ 1A. *Did it ever have one?*

Yes.....	1	*12/*
No.....	2	
No response.....	9	

____ 2. *Are the personnel who are part of your emergency medical service trained to provide (service)?*

	Yes	No	No response	
Cardiac defibrillation	1	2	9	*13/*
ECG tranemission	1	2	9	*14/*
Drug administration	1	2	9	*15/*

____ 3. *What department supervises the personnel of the emergency medical service operation?*

Fire department alone.....	1	*16/*
Fire department and other agency.....	2	
Other agency, with fire department consulted (name agency) _____	3	
Other agency (list) _____	4	
No response.....	9	

IF ALL ANSWERS ARE NEGATIVE--i.e., Q.1 = 2,9; Q.1A = 2,9; Q.2 = 2,9 ON TWO OF THREE SERVICES; OR Q.3 = 3,4,9--GO TO Q.35, THEN TERMINATE INTERVIEW

____ 4. *Does your emergency medical service operation use specially equipped mobile intensive care vehicles?*

[IF NO] *How is the equipment carried to the scene of an emergency?*

Yes, special vehicle.....	1	*17/*
No, added to existing fire trucks.....	2	
No, carried in a car.....	3	
No, other (list)_____	4	
No, combination (list)_____	5	
No, no response.....	6	
No response.....	9	

____ 4A. *How many mobile intensive care units are currently in operation?* [ENTER NUMBER OF UNITS; ENTER 9 IF NO RESPONSE]

units ☐ *18/*

___ 5. *What year was the first unit acquired?*
[ENTER TWO-DIGIT YEAR; ENTER 99 IF NO RESPONSE]

Year ☐☐ *19-20/*

___ 6. *Have any of the units currently in operation replaced older models?*

Yes..... 1 *21/*
No...(GO TO Q.7)..... 2
No response..... 9

___ 6A. *How many models of units preceded the current ones?*
[ENTER NUMBER OF MODELS; ENTER 9 IF NO RESPONSE]

models preceding current ones ☐ *22/*

___ 7. *Have any units either been removed from service or moved to another agency* [WITHOUT BEING REPLACED]?

Yes..... 1 *23/*
No...(GO TO Q.8)..... 2
No response..... 9

7A. *How many were removed or moved?*

During what years?

[IF MOVED] *To what agency?*

Why did this change occur?

[NOTE "NOT SURE" RESPONSES WITH ASTERISK]

Number	Year	Agency	Reason		
_____	_____	_____	_____	☐☐☐☐☐☐	*24-29/*
_____	_____	_____	_____	☐☐☐☐☐☐	*30-35/*
_____	_____	_____	_____	☐☐☐☐☐☐	*36-41/*

___ 8. *Was there any technical assistance from outside your department in order to begin the mobile intensive care unit?*

Yes, manufacturer..... 1 *42/*
Yes, other fire department.... 2
Yes, local university..... 3
Yes, other (list)_____ 4
Yes, combination (list)
_____ 5
No...(GO TO Q.9)..... 6
No response..... 9

___ 8A. *Did any of the individuals who provided this assistance become employees of the fire department or mobile intensive care unit?*

Yes..... 1 *43/*
No..... 2
No response..... 9

____ 9. *Has there been any <u>continuing</u> technical assistance from outside the department for this operation?*

Yes, manufacturer.....	1	44/
Yes, other fire department....	2	
Yes, local university.....	3	
Yes, other (list)_____	4	
Yes, combination (list) _____	5	
No.....	6	
No response.....	9	

____10. *Is there a service contract for repair and maintenance of the emergency medical equipment?*

[IF YES] *With whom?*

[IF NO] *Who provides repair and maintenance?*

Yes, contract with manufacturer.	1	45/
Yes, contract with other outside group (list)_____	2	
Yes, no response for by whom....	3	
No, service provided by department.....	4	
No, service provided by other agency (list)_____	5	
No, no response for by whom.....	6	
No response.....	9	

B. SERVICES

USE FOLLOWING CHART FOR QUESTIONS 11-14; NOTE "NOT SURE" RESPONSES BY PLACING ASTERISK IN BOX WITH CHECK MARK.

11. *What are the prehospital services the emergency medical personnel provide?*

12. *What year was (service) first performed by a member of your staff?*

13. *Of the services you have mentioned, what are the top three that are performed most often?*

14. *Are there any prehospital services that were once provided but are no longer?*

[IF YES] *Which services?*

[IF YES] *What are the main reasons that these services are no longer part of the emergency medical operation?* (list)

_____

_____

CODING FORM FOR QUESTIONS 11-14

ENTER 1 IF YES, 2 IF NO, 9 IF NO RESPONSE FOR ALL QUESTIONS EXCEPT Q.12; FOR Q.12, ENTER TWO-DIGIT YEAR OR 99 IF NO RESPONSE; NOTE "NOT SURE" RESPONSES BY PLACING ASTERISK IN BOX NEXT TO ENTERED NUMBER.

Service	Q.11	Q.12	Q.13	Q.14	
Basic first aid					*46-50/*
Cardio-pulmonary resuscitation					*51-55/*
I.V. therapy					*56-60/*
Drug administration					*61-65/*
Ventilation techniques					*66-70/*

Keypuncher: Go to new card--punch 2 in col. 1, duplicate cols. 2-10

Recognition of cardiac arrhythmias					*11-15/*
Cardiac defibrillation					*16-20/*
ECG transmission					*21-25/*
Other:					*26-30/*
Other:					*31-35/*
Other:					*36-40/*

14A. *Are there any other city agencies that offer on-site emergency medical services like those provided by your department?*
[NOTE: SOPHISTICATED TECHNIQUES, NOT JUST FIRST AID]

41/

Yes, local hospital..... 1
Yes, police department..... 2
Yes, other (list)_____ 3
Yes, combination (list) _____ 4
Yes, no response..... 5
No..... 6
No response..... 9

15. *Does the department provide transport for victims when hospital care is deemed necessary?*

[IF YES] *In what vehicle?*

[IF NO] *Who provides transport?*

Yes, mobile intensive care unit.	1	*42/*
Yes, ambulance.....	2	
Yes, other (list)_____	3	
Yes, combination (list) _____	4	
No, private ambulance firm.....	5	
No, city ambulance.....	6	
No, other (list)_____	7	
No, combination (list) _____	8	
No response.....	9	

[IF YES] *What year did the department first provide transport?*
[ENTER TWO-DIGIT YEAR; ENTER 99 IF NO RESPONSE]

Year ☐☐ *43-44/*

C. STAFF AND ADMINISTRATION

USE FOLLOWING CHART FOR QUESTIONS 16-18; NOTE "NOT SURE" RESPONSES BY PLACING ASTERISK TO RIGHT OF CIRCLED NUMBER.

16. *Does the department have (personnel) associated with the mobile intensive care unit operation in its current budget?*

[IF YES] *How many full-time equivalent (personnel) are there?* [ENTER TWO-DIGIT NUMBER; ENTER 99 IF NO RESPONSE]

[IF NO, ENTER 00]

17. *Is (personnel) a permanent position in the department's budget?*

18. *Is there a specific civil service or other official personnel classification for (personnel)?*

Personnel	Q.16 NUMBER FTE?		Q.17 POSITION PERMANENT? Yes	No	No Response	Q.18 CLASSIFICATION? Yes	No	No Response	
Coordinator			1	2	9	1	2	9	*45-48/*
MICU staff: Paramedics			1	2	9	1	2	9	*49-52/*
MICU staff: EMT-advanced			1	2	9	1	2	9	*53-56/*
MICU staff: EMT-basic			1	2	9	1	2	9	*57-60/*
MICU-staff: Other			1	2	9	1	2	9	*61-64/*
Civilian medical personnel			1	2	9	1	2	9	*65-68/*
Firemen			1	2	9	1	2	9	*69-72/*
Other (list):			1	2	9	1	2	9	*73-76/*

Keypuncher: Go to new card--punch 3 in col. 1, duplicate cols. 2-10.

USE MOST SOPHISTICATED PERSONNEL TITLE MENTIONED ABOVE, EXCEPT COORDINATOR, FOR QUESTIONS 19-20.

___19. *For new (personnel), what kind of formal training is routinely provided by the department?*

Special training sessions by manufacturer	1	*11/*
Formal training classes run by department	2	
Training in fire academy	3	
Other (list)_____	4	
Combination (list)_____	5	
None...(GO TO Q.20)	6	
No response	9	

19A. *How many classes of (personnel) have gone through the initial training program?*
[ENTER TWO-DIGIT NUMBER; ENTER 99 IF NO RESPONSE]

classes ☐☐ *12-13/*

___20. *In order for a person to qualify as a (personnel), must he or she pass a special exam and/or be a fire officer?*

Yes exam and yes employee	1	*14/*
Yes exam and no employee	2	
No exam and yes employee...(GO TO Q.20B)	3	
No exam and no employee...(GO TO Q.20B)	4	
No response	9	

___ 20A. *What agency gives the exam?*
[PROBE TO DETERMINE IF CIVIL SERVICE]

Yes, civil service	1	*15/*
Yes, test by department	2	
Yes, test by local health department or hospital	3	
Yes, test by other agency (name agency)_____	4	
Yes, combination (list)_____	5	
No response	9	

___ 20B. *For (personnel) who have been initially trained, what kind of update training is routinely provided by the department?*

Special training sessions by manufacturer	1	*16/*
Formal training classes run by department	2	
Training in fire academy	3	
Other (list)_____	4	
Combination (list)_____	5	
None...(GO TO Q.21)	6	
No response	9	

___ 20C. *About how often are these training sessions held?*

Once every two years	1	17/
Once every 18 months	2	
Once a year	3	
Once every 6 months	4	
Other (list)_____	5	
No response	9	

___21. *How many individuals have filled the coordinator position, including the present one?*
[ENTER TWO-DIGIT NUMBER; ENTER 99 IF NO RESPONSE]

coordinators ☐☐ 18-19/

[IF MORE THAN ONE] *What position does the previous coordinator now hold?* (list) _____ ☐ 20/

___22. *Who was responsible for first introducing the mobile intensive care unit operation into the department?*

Chief of Department...(ANSWER Q.22A)	1	21/
Staff person within department ...(ANSWER Q.22A)	2	
Staff person in other agency (give position)_____	3	
Person outside city government	4	
Group of persons (e.g., city council, agency consortium)	5	
Combination (list)_____	6	
Other (list)_____	7	
No response	9	

22A. *Is this person still with the department?*

Yes...(ANSWER Q.22B)	1	22/
No	2	
No response	9	

22B. *In what position?*
(list) _____ ☐ 23/

____23. *Why was the mobile intensive care unit operation initiated?*

Growing demands for better pre-hospital care.....	1	24/
Rising incidence of deaths that might have been prevented.....	2	
Specific need or crisis (list) _____	3	
All of the above.....	4	
Combination of above (list) _____	5	
Other (list)_____	6	
No response.....	9	

____24. *Where do most of the operating funds for the operation come from?*

Regular part of Department budget.....	1	25/
Some other part of municipal budget.....	2	
Federal grants or funds.....	3	
Special bond issue or other levy.....	4	
State grants or funds.....	5	
Combination (list)_____	6	
Other (list)_____	7	
No response.....	9	

____25. *Within the fire department's organization, is the mobile intensive care unit operation a separate section or part of another section?*

Separate section.....	1	26/
Part of another section (list) _____	2	
Other (list)_____	3	
No response,.....	9	

____26. *Were there ever any federal, state, or foundation funds used to support the mobile intensive care unit operation?*

Yes, federal	1	27/
Yes, state	2	
Yes, foundation	3	
Yes, combination (list) _____	4	
No...(GO TO Q.27)	5	
No response	9	

26A. *Where did these funds come from?* [ENTER 9 IF NO RESPONSE]

26B. *During what years?* [ENTER 99-99 IF NO RESPONSE]

26C. *What was the amount?* [ENTER 99 IF NO RESPONSE; MAY ROUND TO NEAREST $100,000 OR LIST RANGE]

[PLACE ASTERISK NEXT TO ANY "NOT SURE" RESPONSE]

Source	Years	Amount		
_____	_____	_____		28-34/
_____	_____	_____		35-41/
_____	_____	_____		42-48/
_____	_____	_____		49-55/
_____	_____	_____		56-62/

27. *What was the annual budget for the operation during 1976, excluding personnel and salaries? 1975? 1974?*
[ENTER AMOUNT; ENTER 999 IF NO RESPONSE; MAY ROUND TO NEAREST $100,000 OR LIST RANGE; NOTE "NOT SURE" RESPONSES WITH ASTERISK]

1976 _____		63-66/
1975 _____		67-70/
1974 _____		71-74/

____28. *Are there any state or local laws or regulations that call for the existence of the mobile intensive care unit operation?*

Yes (list)_____	1	75/
No	2	
No response	9	

____29. *Are any of the services the personnel provide called for or regulated by some state or local law or regulation?*

Yes (list)_____	1	76/
No	2	
No response	9	

Keypuncher: Go to new card--punch 4 in col. 1, duplicate cols. 2-10.

D. INTERNAL FACTORS

____30. *Have any service benefits from the mobile intensive care unit operation been recognized within the fire department?*

Yes...(ANSWER Q.30A).....	1	*11/*
No.....	2	
No response.....	9	

____ 30A. *How have these service benefits been recognized--reported in the budget, discussed in budget justifications, special studies or evaluations, or some other way?*

Specific savings or efficiencies reported in budget.....	1	*12/*
Specific savings or efficiencies discussed in budget justifications.....	2	
Special studies or evaluations	3	
Combination of above (list) _____	4	
Other (list)_____	5	
None of above...(GO TO Q.31)..	6	
No response...(GO TO Q.31)....	9	

____ 30B. *What is one example of a service benefit?* (list)

_____ ☐ *13/*

_____

____31. *In your opinion, has there been resistance of <u>any</u> sort by departmental personnel regarding the mobile intensive care unit operation?*

Yes...(ANSWER Q.31A).....	1	*14/*
No.....	2	
No response.....	9	

____ 31A. *What was the nature of the resistance?*

Over specific services only...	1	*15/*
Over initial adoption.....	2	
Over entire program.....	3	
Other (list)_____	4	
Combination (list)_____	5	
No response.....	9	

E. EXTERNAL FACTORS

____32. *Has there been any publicity regarding the department's mobile intensive care unit operation?*

Yes, local media or press.....	1	16/
Yes, national media or press..	2	
Yes, both.....	3	
No...(GO TO Q.33).....	4	
No response...(GO TO Q.33)....	9	

____ 32A. *Has the publicity generally been favorable, mixed, or unfavorable?*

Favorable.....	1	17/
Mixed.....	2	
Unfavorable.....	3	
No response.....	9	

USE FOLLOWING CHART FOR QUESTIONS 33-34; NOTE "NOT SURE" RESPONSES BY PLACING ASTERISK TO RIGHT OF CIRCLED NUMBER.

33. *Have there been any active supporters of the operation outside of the fire department?* [USE LIST AS PROBE]

34. *Have there been any active opposers of the operation outside of the fire department?* [USE LIST AS PROBE]

	Q.33 SUPPORTERS			Q.34 OPPOSERS			
Activists	Yes	No	No Response	Yes	No	No Response	
Municipal executive	1	2	9	1	2	9	18-19/
Other municipal officers	1	2	9	1	2	9	20-21/
Local legislators	1	2	9	1	2	9	22-23/
Citizen groups	1	2	9	1	2	9	24-25/
Local hospital	1	2	9	1	2	9	26-27/
Other:	1	2	9	1	2	9	28-29/

____35. *In the next year or so, do you see any difficulties affecting the operation other than budget?*

Yes...(ANSWER Q.35A).....	1	30/
No.....	2	
No response.....	9	

____ 35A. *What are these difficulties?* (list)

_____ ☐ 31/

_____

CLOSED-CIRCUIT TELEVISION

City and State _____

Respondent's Name _____

Title _____

Telephone Number _____

Interview Dates _____

Secondary Respondent's Name _____

Title _____

Telephone Number _____

Appointment set for (day) _____

(time) _____ (with) _____

If School District was called previously for any innovation:

Respondent's Name _____

Title _____

Telephone Number _____

Date of Call _____

Innovation _____

Rand Screeners _____

A. EQUIPMENT

____ 1. *Have the schools in your district ever used instructional television?*

Yes...(GO TO Q.2).....	1	11/
No...(GO TO Q.45).....	2	
No response.....	9	

____ 2. *Can the school district (or any part of it) transmit the same television program to several different classrooms at the same time?*

Yes...(GO TO Q.2A AND 2B).....	1	12/
No.....	2	
No response.....	9	

____ 2A. *How does transmission take place?*

Cable.....	1	13/
Dedicated channel.....	2	
Microwave.....	3	
Other (list)_____	4	
Combination of above (list)_____	5	
Regular over-the-air television broadcast by local TV station.....	6	
No response.....	9	

____ 2B. *Does the school district operate the central facility that transmits these programs?*

School district alone.....	1	14/
School district and other agency....	2	
Other agency, with school district consulted as users (name agency) _____	3	
No response.....	9	

IF Q.1 = 2,9; OR Q.2 = 2,9; OR Q.2A = 6,9; OR Q.2B = 3,9; GO TO Q.45, THEN TERMINATE INTERVIEW.

____ 3. *Please describe the basic equipment used for actually transmitting programs from the central facility (e.g., amplifiers, antenna, other transmitting equipment).*

_____

_____ ☐☐ 15-16/

____ 4. *Is the central facility's transmitting equipment still in use?*

Yes.....	1	17/
No...(GO TO Q.4A).....	2	
No response.....	9	

____ 4A. *What was the last year it was used?*
[ENTER TWO-DIGIT YEAR; ENTER 99 IF NO RESPONSE]

Year ☐☐ 18-19/

____ 5. *Does this facility serve the entire district, a group of schools, or a single school only?*

District-wide.....	1	20/
More than one school.....	2	
One school only.....	3	
No response.....	9	

____ 6. *Has any of the transmitting equipment been updated, and if so, how many times?*
[ENTER NUMBER OF TIMES; ENTER 9 IF NO RESPONSE]

times updated ☐ 21/

____ 7. *What was the first year in which programs were transmitted?*
[ENTER TWO-DIGIT YEAR; ENTER 99 IF NO RESPONSE]

Year ☐☐ 22-23/

____ 8. *How many television receivers can receive the programs that are transmitted?*
[ENTER THREE-DIGIT NUMBER; ENTER 999 IF NO RESPONSE]

television sets ☐☐☐ 24-26/

____ 9. *Is the main transmitting equipment purchased, leased, or on a lease-purchase option?*

Purchased...(ANSWER Q.9A).....	1	27/
Leased...(ANSWER Q.10).....	2	
Lease-purchase...(GO TO Q.11).....	3	
Other (list)_____	4	
No response...(GO TO Q.11).....	9	

____ 9A. *When was it purchased?*
[ENTER TWO-DIGIT YEAR; ENTER 99 IF NO RESPONSE]

Year ☐☐ 28-29/

____10. *How many years is the lease for?*
[ENTER ONE DIGIT; ENTER 9 IF NO RESPONSE]

# of years ☐ 30/

____11. *Is there a service contract for repair and maintenance of the transmitting equipment?*

[IF YES] *With whom?*

[IF NO] *Who provides repair and maintenance?*

Yes, contract with manufacturer.....	1	31/
Yes, contract with other outside group (list)_____	2	
Yes, no response for by whom.....	3	
No, service provided by district....	4	
No, service provided by other agency (list)_____	5	
No, no response for by whom.....	6	
No response.....	9	

____12. *Was there any technical assistance from outside the district in order to begin transmitting the instructional programs?*

[IF YES] *From what source?*

Yes, manufacturer	1	32/
Yes, other education agency	2	
Yes, local university	3	
Yes, other (list)_____	4	
Yes, combination (list)_____	5	
No	6	
No response	9	

____13. *Has there been any <u>continuing</u> technical assistance from outside the district in transmitting the instructional programs?*

[IF YES] *From what source?*

Yes, manufacturer	1	33/
Yes, other education agency	2	
Yes, local university	3	
Yes, other (list)_____	4	
Yes, combination (list)_____	5	
No	6	
No response	9	

B. SERVICES

USE THE FOLLOWING CHART FOR QUESTIONS 14-17; NOTE "NOT SURE" RESPONSES BY PLACING ASTERISK IN BOX WITH CHECK MARK.

14. *How do teachers in elementary/secondary schools use the main programs transmitted by the central facility?* [PROBE WITH LIST]

15. *What year was (program) first transmitted?*

16. *Of the programs that the central facility provides, which are the top three that are responsible for most of the television time in the schools?*

17. *Have there been any problems in setting priorities among different programs because of limitations on the capacity of the central facility?*

[IF YES] *Which programs?*

[IF YES] *How has the district dealt with such problems?* (list)

_____

_____

ENTER 1 IF YES, 2 IF NO, 9 IF NO RESPONSE FOR ALL QUESTIONS EXCEPT Q.15; FOR Q.15, ENTER TWO-DIGIT YEAR OR 99 IF NO RESPONSE; NOTE "NOT SURE" RESPONSES BY PLACING ASTERISK IN BOX NEXT TO ENTERED NUMBER.

ELEMENTARY SCHOOL PROGRAMS	Q.14	Q.15	Q.16	Q.17	
Math (discretionary or remedial)					*34-38/*
Math (mandatory for regular classes)					*39-43/*
Reading (discretionary or remedial)					*44-48/*
Reading (mandatory for regular classes)					*49-53/*
Science (discretionary or remedial)					*54-58/*
Science (mandatory for regular classes)					*59-63/*

Keypuncher: Go to new card--punch 2 in col. 1, duplicate cols. 2-10.

Social studies (discretionary or remedial)					*11-15/*
Social studies (mandatory for regular classes)					*16-20/*
Other:					*21-25/*
JUNIOR HIGH OR HIGH SCHOOL PROGRAMS					
Math (discretionary or remedial)					*26-30/*
Math (mandatory for regular classes)					*31-35/*
Reading (discretionary or remedial)					*36-40/*
Reading (mandatory for regular classes)					*41-45/*
Science (discretionary or remedial)					*46-50/*
Science (mandatory for regular classes)					*51-55/*
Social studies (discretionary or remedial)					*56-60/*
Social studies (mandatory for regular classes)					*61-65/*
Other:					*66-70/*

C: STAFF AND ADMINISTRATION

USE FOLLOWING CHART FOR QUESTIONS 18-20; NOTE "NOT SURE" RESPONSES BY PLACING ASTERISK TO RIGHT OF CIRCLED NUMBER.

____18. *Does the district have (personnel) associated with the television facilities in its current budget?*

[IF YES] *How many full-time equivalent (personnel) are there?* [ENTER TWO-DIGIT NUMBER; ENTER 99 IF NO RESPONSE]

[IF NO, ENTER 00]

____19. *Is (personnel) a <u>permanent</u> position in the district's budget?*

____20. *Does the specific civil service or other official personnel classification include television-related qualifications for (personnel)?*

Keypuncher: Go to new card--punch 3 in col. 1, duplicate cols. 2-10.

Personnel	Q.18 #FTE?		Q.19 POSITION PERMANENT? Yes	No	No Response	Q.20 CLASSIFICATION? Yes	No	No Response	
General Coordinator			1	2	9	1	2	9	*11-14/*
Production Staff			1	2	9	1	2	9	*15-18/*
Engineering and Technical			1	2	9	1	2	9	*19-22/*
Other:			1	2	9	1	2	9	*23-26/*
Other:			1	2	9	1	2	9	*27-30/*

____21. *For the teaching staff, what kind of <u>formal</u> training is routinely provided by the district in order to use the television programs?* *31/*

Informal assistance..... 1
Special classes run by district..... 2
Classes at local college or manufacturer..... 3
Other (list)_____ 4
Combination (list)_____ 5
None...(GO TO Q.23)..... 6
No response...(GO TO Q.23)..... 9

____22. *What proportion of the eligible teaching staff has participated in this training?*

Most or all	1	*32/*
About half	2	
Few or a small minority	3	
None	4	
No response	9	

____23. *In order for a new person to qualify for teaching positions that use television programs, must he or she have had formal training in using television in the classroom?*

Yes	1	*33/*
No	2	
No response	9	

____24. *How many individuals have filled the coordinator position, including the present one?*
[ENTER TWO-DIGIT NUMBER; ENTER 99 IF NO RESPONSE]

coordinators ☐☐ *34-35/*

[IF MORE THAN ONE] *What position does the previous coordinator now hold?* (list)
_____ ☐ *36/*

____25. *Was the coordinator ever a teacher in the district and what position does the coordinator have?* [PROBE WITH LIST]

Not teacher, in television or AV unit	1	*37/*
Yes, teacher, in television or AV unit	2	
Yes, teacher, on other instructional staff	3	
Other (list)_____	4	
No response	9	

____26. *Does any member of the curriculum (instructional) department assist in the television operations?* [PROBE WITH LIST]

Serves as main coordinator	1	*38/*
Collaborates with television unit in coordinating television use	2	
Other (list)_____	3	
Combination (list)_____	4	
None	5	
No response	9	

____27. *Who was responsible for initiating the transmission of television programs into the district?*

Superintendent...(ANSWER Q.27A).....	1	*39/*
Staff person within television or AV units (ANSWER Q.27A).....	2	
Staff person within other instructional staff (ANSWER Q.27A).....	3	
Person outside district.....	4	
Group of persons (e.g., city council, agency consortium).....	5	
Combination of above (list) _____	6	
Other (list)_____	7	
No response.....	9	

____ 27A. *Is this person still with the district?*

Yes..,(ANSWER Q.27B).....	1	*40/*
No.....	2	
No response.....	9	

____ 27B. *In what position?* (list)_____ ☐ *41/*

____28. *Why was the transmission of programs initiated?*

Growing demands from teachers or students.....	1	*42/*
Rising enrollment.....	2	
Specific need or crisis (list) _____	3	
All of above.....	4	
Combination of above (list)_____	5	
Other (list)_____	6	
No response.....	9	

____29. *Was over-the-air television used in the classroom before the central facility was introduced?*

Yes.....	1	*43/*
No.....	2	
No response.....	9	

____30. *Do classrooms currently receive over-the-air programs directly?*

Yes.....	1	*44/*
No.....	2	
No response.....	9	

____31. *Where do most of the television programs that are transmitted from the central facility come from?*

Produce own programs.....	1	*45/*
Tape over-the-air programs and retransmit.....	2	
Purchase programs separately.....	3	
Other (list)_____	4	
No response.....	9	

____32. *Where do most of the operating funds for the central facilities and television equipment come from?* [USE LIST AS PROBE]

Regular part of district budget.....	1	46/
Some other part of municipal budget	2	
Federal grants or funds.....	3	
Special bond issue or other levy....	4	
State grants or funds.....	5	
Combination (list)_____	6	
Other (list)_____	7	
No response.....	9	

____33. *Were there ever any federal, state, or foundation funds used to support these activities?*

Yes, federal.....	1	47/
Yes, state.....	2	
Yes, foundation.....	3	
Yes, combination (list)_____	4	
No...(GO TO Q.34).....	5	
No response.....	9	

33A. *Where did these funds come from?* [ENTER 9 IF NO RESPONSE]

33B. *During what years?* [ENTER 99-99 IF NO RESPONSE]

33C. *What was the amount?* [ENTER 99 IF NO RESPONSE; MAY ROUND TO NEAREST $100,000 OR LIST RANGE]

[PLACE ASTERISK NEXT TO ANY "NOT SURE" RESPONSE]

Source	Years	Amount		
_____	_____	_____	☐☐☐☐☐☐☐	48-54/
_____	_____	_____	☐☐☐☐☐☐☐	55-61/
_____	_____	_____	☐☐☐☐☐☐☐	62-68/

Keypuncher: Go to new card--punch 4 in col. 1, duplicate cols. 2-10.

34. *What was the annual budget for the central operation and the television equipment during 1976, excluding personnel and salaries? 1975? 1974?* [ENTER AMOUNT; ENTER 999 IF NO RESPONSE; MAY ROUND TO NEAREST $100,000 OR LIST RANGE; NOTE "NOT SURE" RESPONSE WITH ASTERISK]

1976 _____	☐☐☐☐	11-14/
1975 _____	☐☐☐☐	15-18/
1974 _____	☐☐☐☐	19-22/

___35. *Have any changes in textbook adoptions been made due to the use of the television programs?* [USE HIGHEST]

New texts with special sections for all relevant classes	1	23/
New texts with special sections for some classes	2	
Supplementary television-related materials	3	
Texts for special television courses	4	
None	5	
Other (list)_____	6	
No response	9	

___36. *Are there any state or local laws or regulations that call for the existence of the central facility or television programs?*

Yes (list)_____	1	24/
No	2	
No response	9	

___37. *Are any of the television programs linked to some state or local law or regulation?*

Yes (list)_____	1	25/
No	2	
No response	9	

D. INTERNAL FACTORS

USING FOLLOWING CHART FOR Q.38, NOTE "NOT SURE" RESPONSES BY PLACING ASTERISK TO RIGHT OF CIRCLED NUMBER.

38. *To what extent do teachers in different subjects use the television programs that are transmitted by the central facility?*

Subject	Most	Few	None	No Response	
Math	1	2	3	9	26/
Reading	1	2	3	9	27/
Science	1	2	3	9	28/
Social science	1	2	3	9	29/
Other:	1	2	3	9	30/

___39. *Are the television receivers used in the teacher's own classroom?*

Yes	1	31/
No, special classroom (e.g., library) for television sets	2	
No response	9	

___40. *Have any service benefits from the programs transmitted by the central facility been recognized?*

Yes...(ANSWER Q.40A)	1	32/
No	2	
No response	9	

___ 40A. *How have these service benefits been recognized--reported in the budget, discussed in budget justifications, special studies or evaluations, or some other way?*

Specific savings or efficiencies reported in budget	1	33/
Specific savings or efficiencies discussed in budget justifications	2	
Special studies or evaluations	3	
Combination of above (list) _____	4	
Other (list) _____	5	
None of above...(GO TO Q.41)	6	
No response...(GO TO Q.41)	9	

___ 40B. *What is one example of a service benefit?* (list)

_____ ☐ 34/

_____

___41. *In your opinion, has there been resistance of <u>any</u> sort by district personnel in using the programs that are transmitted?*

Yes...(ANSWER Q.41A)	1	35/
No	2	
No response	9	

___ 41A. *What was the nature of the resistance?*

Over specific applications only	1	36/
Over initial adoption	2	
Over use of the entire system	3	
Other (list) _____	4	
Combination (list) _____	5	
No response	9	

E. EXTERNAL FACTORS

____42. *Has there been any publicity regarding the central facility or the programs that are transmitted?*

Yes, local media or press	1	37/
Yes, national media or press	2	
Yes, both	3	
No...(GO TO Q.43)	4	
No response...(GO TO Q.43)	9	

____ 42A. *Has the publicity generally been favorable, mixed, or unfavorable?*

Favorable	1	38/
Mixed	2	
Unfavorable	3	
No response	9	

USE FOLLOWING CHART FOR QUESTIONS 43-44; NOTE "NOT SURE" RESPONSES BY PLACING ASTERISK TO RIGHT OF CIRCLED NUMBER.

43. *Have there been any active supporters of the central facility and its television programs outside of the school district?*

44. *Have there been any active opposers outside of the school district?*

	Q.43			Q.44			
	SUPPORTERS OR USERS			OPPOSERS			
Activists	Yes	No	No Response	Yes	No	No Response	
Municipal executive	1	2	9	1	2	9	39-40/
Other municipal officers	1	2	9	1	2	9	41-42/
Local legislators	1	2	9	1	2	9	43-44/
Citizen groups	1	2	9	1	2	9	45-46/
Parents	1	2	9	1	2	9	47-48/
Other:	1	2	9	1	2	9	49-50/

____45. *In the next year or so, do you see any difficulties affecting your educational television operation other than budget?*

Yes...(ANSWER Q.45A)	1	51/
No	2	
No response	9	

45A. *What are these difficulties?* (list)

_____ ☐ 52/

_____

BREATH TESTING

City and State _____

Respondent's Name _____

Title _____

Telephone Number _____

Interview Dates _____

Secondary Respondent's Name _____

Title _____

Telephone Number _____

Appointment set for (day) _____

(time) _____ (with) _____

If Police Department was called previously for any innovation:

Respondent's Name _____

Title _____

Telephone Number _____

Date of Call _____

Innovation _____

Rand Screeners _____

A. EQUIPMENT

____ 1. *How does your department currently test persons suspected of driving under the influence of alcohol?*

Breath analysis (or breath testing) ...(GO TO Q.?)	1	11/
Breath screening only (balloon)	2	
Urinalysis	3	
Blood analysis	4	
Other (list)_____	5	
Combination (list)...(GO TO Q.2 IF BREATH ANALYSIS IS INCLUDED)		
_____	6	
No response	9	

____ 1A. *Has your department ever used any kind of breath analysis equipment in its routine operations?*

Yes...(GO TO Q.2)	1	12/
No, demonstration only	2	
No, never	3	
No response	9	

____ 1B. *What have been the main reasons for not using any breath analysis equipment in routine operations?*

_____

_____ ☐ 13/

[TERMINATE INTERVIEW AFTER Q.1B]

____ 2. *What is the major piece of breath analysis equipment you use?*

Breathalyzer	1	14/
Other (list)_____	2	
Combination (list)_____	3	
No response	9	

____ 3. *How many are actually in everyday operation? How many serve as backup equipment?*
[ENTER TWO-DIGIT NUMBER; ENTER 99 IF NO RESPONSE]

# in operation	☐☐	15-16/
# of backups	☐☐	17-18/

____ 4. *When was the equipment first used in everyday operation?*
[ENTER TWO-DIGIT YEAR; ENTER 99 IF NO RESPONSE]

Year	☐☐	19-20/

____ 5. *Is the current equipment purchased, leased, or on a lease-purchase option?*

Purchased...(ANSWER Q.5A).....	1	21/
Leased...(ANSWER Q.6).....	2	
Lease-purchase...(GO TO Q.6).....	3	
Other (list)_____	4	
No response...(GO TO Q.7).....	9	

____ 5A. *When was this equipment purchased?*
[ENTER TWO-DIGIT YEAR; ENTER 99 IF NO RESPONSE]

Year ☐☐ 22-23/

____ 6. *How many years is the lease for?*
[ENTER ONE DIGIT; ENTER 9 IF NO RESPONSE]

# of years ☐ 24/

____ 7. *Has any of the original equipment been replaced by new equipment?*
[IF YES] *How many models followed the original one?*
[ENTER 0 IF NO; ENTER 9 IF NO RESPONSE]

models following original ☐ 25/

____ 8. *Have you ever used videotapes for persons suspected of driving under the influence?*

Yes...(GO TO Q.8A).....	1	26/
No.....	2	
No response.....	9	

____ 8A. *When were videotapes first used for this purpose?*
[ENTER TWO-DIGIT YEAR; ENTER 99 IF NO RESPONSE]

Year ☐☐ 27-28/

____ 8B. *When were they last used?*
[ENTER TWO-DIGIT YEAR; ENTER 99 IF NO RESPONSE]

Year ☐☐ 29-30/

____ 8C. *Are the videotapes used to record the suspect's motor skills or to record the taking of the breath analysis test (or both)?*

Motor skills only.....	1	31/
Breath analysis test only.....	2	
Both.....	3	
Neither.....	4	
Other (list)_____	5	
Combination (list)_____	6	
No response.....	9	

____ 9. *Before the breath analysis equipment was used, how did the department test persons suspected of driving under the influence of alcohol?*

Breath screening.....	1	32/
Urinalysis.....	2	
Blood analysis.....	3	
Other (list)_____	4	
Combination (list)_____	5	
None...(GO TO Q.10).....	6	
No response...(GO TO Q.10).....	9	

9A. *Is this procedure still used at all, and if so, how frequently?*
[PERCENTAGE; INDICATE IF EMERGENCY ONLY]

_____

_____ ☐ 33/

____10. *How did your department first hear about the breath analysis equipment?*

From another police department.....	1	34/
From another agency in the city.....	2	
From a manufacturer.....	3	
From an outside group (e.g., PTI, university or consultant).....	4	
From a report or magazine article...	5	
Other (list)_____	6	
No response.....	9	

____11. *What were the main reasons for deciding to use the equipment?*

_____

_____ ☐ 35/

____12. *Is there a service contract for repair and maintenance of the breath analysis equipment?*
[IF YES] *With whom?*

[IF NO] *Who provides repair and maintenance?*

Yes, contract with manufacturer.....	1	36/
Yes, contract with other outside group (list)_____	2	
Yes, no response for by whom.....	3	
No, service provided by department..	4	
No, service provided by other agency (list)_____	5	
No, no response for by whom.....	6	
No response.....	9	

____13. *Where is the breath analysis equipment located?*
[USE LIST AS PROBE]

In a dedicated room (one building only)	1	37/
In a dedicated room (several sites--e.g., precincts)	2	
No dedicated room (one building only)	3	
No dedicated room (several sites)	4	
Other (list)_____	5	
Combination (list)_____	6	
No response	9	

B. SERVICES

____14. *Following a suspect's apprehension, what is the maximum time period within which the suspect must be given a breath test?*

_____ ☐☐ 38-39/

____15. *Is the time period specified by law, police regulations, or common practice?*

Law	1	40/
Regulations	2	
Practice	3	
Other (list)_____	4	
Combination (list)_____	5	
None	6	
No response	9	

____16. *Has there been a standard for deciding what BAC range represents a state of intoxication?*

Yes	1	41/
No...(GO TO Q.17)	2	
No response	9	

____ 16A. *What is the standard?*

_____ ☐ 42/

____ 16B. *Is this standard specified by law, police regulations, or common practice?*

Law	1	43/
Regulations	2	
Practice	3	
Other (list)_____	4	
Combination (list)_____	5	
None	6	
No response	9	

___17. *About how many persons have been given the breath analysis test in the last year? How about for each of the two preceding years?*

_____ (1976) ☐☐☐☐ 44-47/

_____ (1975) ☐☐☐☐ 48-51/

_____ (1974) ☐☐☐☐ 52-55/

___18. *About how many persons refused to take the breath analysis test during 1976?*

_____ ☐☐☐ 56-58/

___19. *What are the penalties, if any, for refusing to take the test?*

_____ ☐ 59/

___20. *Was there any technical assistance from outside your department in order to begin the breath analysis operation?*

Yes, manufacturer	1	60/
Yes, other police department	2	
Yes, local university	3	
Yes, other (list)_____	4	
Yes, combination (list)_____	5	
No	6	
No response	9	

___21. *Has there been any <u>continuing</u> technical assistance from outside the department for this operation?*

Yes, manufacturer	1	61/
Yes, other police department	2	
Yes, local university	3	
Yes, other (list)_____	4	
Yes, combination (list)_____	5	
No	6	
No response	9	

Keypuncher: Go to new card--punch 2 in col. 1, duplicate cols. 2-10

C. STAFF AND ADMINISTRATION

____22. *Who was responsible for first introducing breath analysis into the department?*

Chief of Department...(ANSWER Q.22A)	1	*11/*
Staff person within department (ANSWER Q.22A).....	2	
Staff person in other agency (give position)_____	3	
Person outside city government.....	4	
Group of persons (e.g., city council, agency consortium).....	5	
Combination (list)_____	6	
Other (list)_____	7	
No response.....	9	

____ 22A. *Is this person still with the department?*

Yes...(ANSWER Q.22B).....	1	*12/*
No.....	2	
No response.....	9	

____ 22B. *In what position?* (list)_____ ☐ *13/*

____23. *Within the police department's organization, is the breath analysis operation a separate section or part of another section?*

Separate section.....	1	*14/*
Part of another section (list) _____	2	
Other (list)_____	3	
No response.....	9	

____24. *How many men are trained to operate and repair the breath analysis equipment?*

How many men are trained only to operate the equipment?

# trained as operators & repair	☐☐☐	*15-17/*
# trained as operators only	☐☐☐	*18-20/*

____25. *Do the operators also carry out other assignments or do they operate the breath analysis equipment all the time?*

Operate equipment only.....	1	*21/*
Operate equipment for a shift or two, then do other assignments.....	2	
Operate equipment as one of several assignments during same shift.....	3	
Other (list)_____	4	
Combination (list)_____	5	
No response.....	9	

____26. *Do the operators also run the videotape equipment?*
[IF Q.8 WAS ANSWERED YES]

Yes	1	22/
No	2	
Other (list)_____	3	
No response	9	

____27. *Are there any men in the department who once operated the breath analysis equipment, but who no longer do so?*

Yes	1	23/
No	2	
No response	9	

____28. *Is there a supervisor who coordinates the breath analysis operation?*

Yes	1	24/
No...(GO TO Q.29)	2	
No response	9	

____ 28A. *How many individuals have filled the supervisory role, including the present one?*
[ENTER TWO-DIGIT NUMBER; ENTER 99 IF NO RESPONSE]

coordinators ☐☐ 25-26/

____ 28B. [IF MORE THAN ONE] *What position does the previous supervisor now hold?* (list)
_____ ☐ 27/

____29. *For the new operators, what kind of training programs are provided?*

Special training sessions by manufacturer	1	28/
Formal training classes run by department	2	
Training in police academy	3	
State health department	4	
Other (list)_____	5	
Combination (list)_____	6	
None...(GO TO Q.30)	7	
No response	9	

____ 29A. *How much time does the training take?*

One day or less	1	29/
More than one day but less than one week	2	
More than one week	3	
No response	9	

____ 29B. *How many classes of officers have gone through the training program since the breath analysis equipment was first used?*
[ENTER TWO-DIGIT NUMBER; ENTER 99 IF NO RESPONSE]

classes ☐☐ 30-31/

____ 30. *In order for a person to qualify as an operator, must he or she pass an exam?*

[IF YES] *What agency gives the exam?*
[PROBE TO DETERMINE IF CIVIL SERVICE]

Yes, civil service	1	*32/*
Yes, test by department	2	
Yes, test by other agency (name agency)_____	3	
Yes, combination (list)_____	4	
No	5	
No response	9	

____31. *Must operators also be formally certified?*

[IF YES] *By whom?*

Yes, state health department	1	*33/*
Yes, other (list)_____	2	
Yes, combination (list)_____	3	
No	4	
No response	9	

____32. *For equipment operators who have been initially trained, is there any update training?*

Special training sessions by manufacturer	1	*34/*
Training sessions in police precinct or headquarters	2	
Training sessions in police academy.	3	
Other (list)_____	4	
Combination (list)_____	5	
None	6	
No response	9	

____33. *Who transports a suspect from the street to the site of the breath analysis equipment?*

Regular police officers	1	*35/*
Traffic division only	2	
Mobile unit arrives at street site (no transport)	3	
Other (list)_____	4	
Combination (list)_____	5	
No response	9	

____34. *Do regular patrol officers receive any training about the breath analysis operation?*

Yes, on the job	1	*36/*
Yes, in police academy	2	
Yes, other (list)_____	3	
Combination (list)_____	4	
None	5	
No response	9	

____35. *Were there ever any federal, state, or external funds used to support the breath analysis equipment?*

Yes, federal	1	*37/*
Yes, state	2	
Yes, other (list)_____	3	
Yes, combination (list)_____	4	
No...(GO TO Q.36)	5	
No response	9	

35A. *Where did these funds come from?* [ENTER 9 IF NO RESPONSE]

35B. *During what years?* [ENTER 99-99 IF NO RESPONSE]

35C. *What was the amount?* [ENTER 99 IF NO RESPONSE; MAY ROUND TO NEAREST $100,000 OR LIST RANGE]

[PLACE ASTERISK NEXT TO ANY "NOT SURE" RESPONSE]

Source	Years	Amount		
_____	_____	_____		*38-44/*
_____	_____	_____		*45-51/*
_____	_____	_____		*52-58/*

____36. *Has the specific use of breath analysis equipment been linked to any state or local law or regulation?*

Yes (list)_____	1	*59/*
No	2	
No response	9	

____37. *What formal changes in organizational procedures have been made due to the breath analysis operation?*
[PROBE WITH LIST]

Creation of new organizational units	1	*60/*
Creation of new forms (e.g., for reporting results of alcohol test) (ANSWER Q.38)	2	
Both (ANSWER Q.38)	3	
Neither	4	
Other (list)_____	5	
No response	9	

____38. *Are any of the old forms still available?*

They never existed	1	*61/*
They are still available in the department	2	
They are still available outside the department	3	
They are no longer available	4	
No response	9	

Keypuncher: Go to new card--punch 3 in col. 1, duplicate cols. 2-10

D. INTERNAL FACTORS

____39. *Have there been any service benefits from using the breath analysis equipment?*

Yes...(ANSWER Q.39A).....	1	11/
No.....	2	
No response.....	9	

____ 39A. *How have these service benefits been recognized--reported in the budget, discussed in budget justifications, special studies or evaluations, or some other way?*

Specific savings or efficiencies reported in budget.....	1	12/
Specific savings or efficiencies discussed in budget justifications..	2	
Special studies or evaluations.....	3	
Other (list)_____	4	
Combination (list)_____	5	
None...(GO TO Q.40).....	6	
No response...(GO TO Q.40).....	9	

____ 39B. *What is one example of a service benefit?* (list)

_____ ☐ 13/

_____

____40. *In your opinion, has there been resistance of <u>any</u> sort by departmental personnel regarding the breath analysis operation?*

Yes...(ANSWER Q.40A).....	1	14/
No.....	2	
No response.....	9	

40A. *What was the nature of the resistance?*

Over specific services only.....	1	15/
Over initial adoption.....	2	
Over entire program.....	3	
Other (list)_____	4	
Combination (list)_____	5	
No response.....	9	

____41. *What kind of support has the chief of the department given to the use of the breath analysis operation?*

Introduced the operation.....	1	16/
At least some support.....	2	
Neutral.....	3	
Some opposition.....	4	
No response.....	9	

E. EXTERNAL FACTORS

____42. *Has there been any publicity regarding the department's use of breath analysis?*

Yes, local media or press	1	17/
Yes, national media or press	2	
Yes, both	3	
No..(GO TO Q.43)	4	
No response...(GO TO Q.43)	9	

____ 42A. *Has the publicity generally been favorable, mixed, or unfavorable?*

Favorable	1	18/
Mixed	2	
Unfavorable	3	
No response	9	

USE FOLLOWING CHART FOR QUESTIONS 43-44; NOTE "NOT SURE" RESPONSES BY PLACING ASTERISK TO RIGHT OF CIRCLED NUMBER.

43. *Have there been any active supporters of the breath analysis operation outside of the department?*

44. *Have there been any active opposers of the breath analysis operation outside of the department?*

	Q.43			Q.44			
	SUPPORTERS OR USERS			OPPOSERS			
Activists	Yes	No	No Response	Yes	No	No Response	
Municipal executive	1	2	9	1	2	9	19-20/
Other municipal officers	1	2	9	1	2	9	21-22/
Local legislators	1	2	9	1	2	9	23-24/
Citizen groups	1	2	9	1	2	9	25-26/
Other:	1	2	9	1	2	9	27-28/

____45. *In the next year or so, do you see any difficulties affecting the breath analysis operation other than budget?*

Yes...(ANSWER Q.45A)	1	29/
No	2	
No response	9	

____ 45A. *What are these difficulties?* (list)

_____

_____ ☐ 30/

JET-AXE

City and State _____

Respondent's Name _____

Title _____

Telephone Number _____

Interview Dates _____

Secondary Respondent's Name _____

Title _____

Telephone Number _____

Appointment set for (day) _____

(time) _____ (with) _____

If Fire Department was called previously for any innovation:

Respondent's Name _____

Title _____

Telephone Number _____

Date of Call _____

Innovation _____

Rand Screeners _____

A. EQUIPMENT

____ 1. *Has your department ever used the Jet Axe for firefighting?*

Yes...(GO TO Q.2)..... 1 *11/*
No...(GO TO Q.1A)..... 2
No response...(GO TO Q.1A)..... 9

____ 1A. *Has your department ever purchased the Jet Axe?*

Yes...(GO TO Q.2)..... 1 *12/*
No...(GO TO Q.1B)..... 2
No response...(GO TO Q.1B)..... 9

____ 1B. *Has your department ever heard of the Jet Axe?*

Yes...(GO TO Q.1C, 1D, & 1E)..... 1 *13/*
No...(TERMINATE INTERVIEW)..... 2
No response...(TERMINATE INTERVIEW). 9

____ 1C. *How did your department first hear about the Jet Axe?*

From another fire department..... 1 *14/*
From another agency in the city..... 2
From a manufacturer..... 3
From an outside group (e.g., PTI, university or consultant)..... 4
From a report or magazine article... 5
Other (list)_____ 6
No response..... 9

____ 1D. *Did your department consider using the Jet Axe?*

Yes..... 1 *15/*
No..... 2
No response..... 9

____ 1E. *What were the main reasons for deciding not to use the Jet Axe?*

_____ ☐ *16/*

[TERMINATE INTERVIEW AFTER Q.1E]

____ 2. *When was the first Jet Axe purchased?*

Year ☐☐ *17-18/*

*____ 3. *When was the Jet Axe first used in a fire?*

Year ☐☐ *19-20/*

*____ 4. *When was the Jet Axe last used in a fire?*

Year ☐☐ *21-22/*

*____ 5. *About how many Jet Axes have been used by the department in actual firefighting, for all years?*

_____ # used ☐☐ *23-24/*

*Skip if Q.1A was answered

____ 6. *About how many Jet Axes have been used by the department for training or demonstration purposes, for all years?*

used ☐☐ *25-26/*

____ 7. *About how many Jet Axes are in vehicles or in storage today?*

in vehicles or storage ☐☐ *27-28/*

____ 8. *How did your department first hear about the Jet Axe?*

From another fire department.....	1	*29/*
From another agency in the city.....	2	
From a manufacturer.....	3	
From an outside group (e.g., PTI, university, or consultant).....	4	
From a report or magazine article...	5	
Other (list)_____	6	
No response.....	9	

____ 9. *What were the main reasons for deciding to use the Jet Axe?* [FOR Q.1A: *For what reasons has the Jet Axe not been used in firefighting?*]

_____ ☐ *30/*

_____

B. SERVICES

____10. *How is the Jet Axe transported to the scene of an alarm?*

Chief's car.....	1	*31/*
Ladder or truck.....	2	
Engine or pumper.....	3	
Other vehicle (list)_____	4	
Combination (list)_____	5	
No response.....	9	

____11. *What proportion of these vehicles (of all in this category that are operated by the department) carry the Jet Axe?*

One or two only.....	1	*32/*
A minor portion.....	2	
Most or all.....	3	
No response.....	9	

____12. *Who actually places the Jet Axe to be detonated?*

Chief.....	1	*33/*
Chief's aide.....	2	
Fire officer.....	3	
Other (list)_____	4	
Combination (list)_____	5	
No response.....	9	

____13. *Was there any technical assistance from outside your department in order to begin using the Jet Axe?*

Yes, manufacturer	1	*34/*
Yes, other fire department	2	
Yes, local university	3	
Yes, other (list)_____	4	
Yes, combination (list)_____	5	
No	6	
No response	9	

____14. *Has there been any <u>continuing</u> technical assistance from outside the department for this operation?*

Yes, manufacturer	1	*35/*
Yes, other fire department	2	
Yes, local university	3	
Yes, other (list)_____	4	
Yes, combination (list)_____	5	
No	6	

____15. *When are new Jet Axes purchased to replenish the supply?*

Whenever an existing Jet Axe is used	1	*36/*
Whenever two Jet Axes are used	2	
Whenever several Jet Axes are used	3	
Other (list)_____	4	
No response	9	

____16. *Who decides* [NOT APPROVES] *when to repurchase the Jet Axe for the department?*

Chief	1	*37/*
Assistant Chief	2	
Supply/maintenance officer	3	
Other (list)_____	4	
No response	9	

____17. *How many individuals have filled this role, including the present one?*
[ENTER TWO-DIGIT NUMBER; ENTER 99 IF NO RESPONSE]

coordinators ☐☐ *38-39/*

[IF MORE THAN ONE] *What position does the previous decisionmaker now hold?* (list) _____ ☐ *40/*

____18. *How many models (e.g., sizes) of Jet Axes are kept in supply?*
[ANSWER SHOULD VARY BETWEEN 1 AND 5; ENTER 99 IF NO RESPONSE]

models ☐☐ *41-42/*

____ 18A. *How many Jet Axes are kept in reserve or in inventory within the department but not on any vehicle?*
[ENTER TWO-DIGIT NUMBER; 00 IF NONE; 99 IF NO RESPONSE]

in reserve or inventory ☐☐ *43-44/*

* ____19. *For what types of firefighting tactics has the Jet Axe been used?* [USE LIST AS PROBE]

Blasting for ventilation.....	1	45/
Blasting for access.....	2	
Both.....	3	
Neither.....	4	
Other (list)_____	5	
Combination (list)_____	6	
No response.....	9	

C. STAFFING AND ADMINISTRATION

____20. *Who was responsible for first introducing the Jet Axe into the department?*

Chief of Department...(ANSWER Q.20A)	1	46/
Staff person within department (ANSWER Q.20A).....	2	
Staff person in other agency (give position)_____	3	
Person outside city government.....	4	
Group of persons (e.g., city council, agency consortium).....	5	
Other (list)_____	6	
Combination (list)_____	7	
No response.....	9	

20A. *Is this person still with the department?*

Yes...(ANSWER Q.20B).....	1	47/
No.....	2	
No response.....	9	

20B. *In what position?* (list)_____ ☐ 48/

____21. *What proportion of the firemen are trained to use the Jet Axe?*

A few only (less than six).....	1	49/
A minor portion (less than 50%).....	2	
Most or all of the firemen.....	3	
No response.....	9	

* ____22. *What proportion of the firemen have actually used the Jet Axe in a fire?*

A few only (less than six).....	1	50/
A minor portion (less than 50%).....	2	
Most or all of the firemen.....	3	
No response.....	9	

____23. *For new firemen, what kind of formal training for using the Jet Axe is routinely provided by the department?*

Special training sessions by manufacturer	1	51/
Formal training classes run by department	2	
Training in fire academy	3	
Other (list)_____	4	
Combination (list)_____	5	
None...(GO TO Q.24)	6	
No response	9	

____ 23A. *How much time does the training take?*

Less than half an hour	1	52/
Half an hour to an hour	2	
Over an hour	3	
No response	9	

____ 23B. *How many classes of firemen have gone through the training program since a Jet Axe was first purchased?*
[ENTER TWO-DIGIT NUMBER; ENTER 99 IF NO RESPONSE]

classes ☐☐ 53-54/

____24. *For firemen who have been initially trained, what kind of update training is routinely provided by the department?*

Special training sessions by manufacturer	1	55/
Training sessions in the fire house.	2	
Training in fire academy	3	
Other (list)_____	4	
Combination (list)_____	5	
None	6	
No response	9	

____25. *Where do the funds for purchasing Jet Axes come from?*

Regular part of department budget...	1	56/
Some other part of municipal budget.	2	
Federal grants or funds	3	
Special bond issue or other levy....	4	
State grants or funds	5	
Other (list)_____	6	
Combination (list)_____	7	
No response	9	

____26. *Who determines how much to set aside in each year's budget for new Jet Axe purchases?*

Chief	1	57/
Deputy or Assistant	2	
Budget officer	3	
Other (specify)_____	4	
No response	9	

____27. *Were there ever any federal, state, or external funds used to support the Jet Axe?*

Yes, federal	1	58/
Yes, state	2	
Yes, external	3	
Yes, combination (list)_____	4	
No	5	
No response	9	

____28. *Has the use of the Jet Axe been linked to any state or local law or regulation?*

Yes (list)_____	1	59/
No	2	
No response	9	

Keypuncher: Go to new card--punch 2 in col. 1, duplicate cols. 2-10.

D. INTERNAL FACTORS

* ____29. *Have there been any service benefits from using the Jet Axe?*

Yes...(ANSWER Q.29A)	1	11/
No	2	
No response	9	

* ____ 29A. *What is one example of a service benefit?* (list)

_____

_____ ☐ 12/

____30. *In your opinion, has there been resistance of <u>any</u> sort by departmental personnel regarding the use of the Jet Axe?*

Yes...(ANSWER Q.30A)	1	13/
No	2	
No response	9	

____ 30A. *What was the nature of the resistance?*

Over specific services only	1	14/
Over initial adoption	2	
Over entire program	3	
Other (list)_____	4	
Combination (list)_____	5	
No response	9	

____31. *What kind of support has the chief of the department given to the use of the Jet Axe?*

Introduced the Jet Axe	1	15/
At least some support	2	
Neutral	3	
Some opposition	4	
No response	9	

E. EXTERNAL FACTORS

____32. *Has there been any publicity regarding the department's use of the Jet Axe?*

Yes, local media or press	1	16/
Yes, national media or press	2	
Yes, both	3	
No...(GO TO Q.33)	4	
No response...(GO TO Q.33)	9	

____ 32A. *Has the publicity generally been favorable, mixed, or unfavorable?*

Favorable	1	17/
Mixed	2	
Unfavorable	3	
No response	9	

USE FOLLOWING CHART FOR QUESTIONS 33-34; NOTE "NOT SURE" RESPONSES BY PLACING ASTERISK TO RIGHT OF CIRCLED NUMBER.

33. *Have there been any active supporters of the Jet Axe outside of the fire department?*

34. *Have there been any active opposers of the Jet Axe outside of the fire department?*

	Q.33 SUPPORTERS			Q.34 OPPOSERS			
Activists	Yes	No	No Response	Yes	No	No Response	
Municipal executive	1	2	9	1	2	9	18-19/
Other municipal officials	1	2	9	1	2	9	20-21/
Local legislators	1	2	9	1	2	9	22-23/
Citizen groups	1	2	9	1	2	9	24-25/
Other:	1	2	9	1	2	9	26-27/

____35. *In the next year or so, do you see any difficulties affecting the use of the Jet Axe, other than budget problems?*

Yes...(ANSWER Q.35A)..... 1 *28/*
No..... 2
No response..... 9

____ 35A. *What are these difficulties?* (list)

_____ ☐ *29/*

_____

Appendix C

CASE STUDIES OF INNOVATIONS

Introduction to the Case Studies

This appendix contains eight of the case studies that were developed from the fieldwork. All eight have been reviewed and approved by the service agencies involved with each innovation. The eight therefore serve as illustrative examples of the basic information that was available for each of the case studies. Reviews and approvals were also obtained from the remaining eleven case studies, but in each of these cases the relevant service agency requested that the case studies not be identified with a particular city or site (all agencies were given this option). Therefore, these latter case studies are available from the author but have not been reproduced in the present report.

Each of the case studies in this appendix follows the same basic format from the fieldwork guidelines (see the instrument in Appendix B). For each narrative, sections A and B describe the background and the nature of the innovation; section C covers the current status of routinization as of the time of the case study (i.e., passages and cycles as described in Chapter III of the text); and section D reviews the ten hypotheses that had previously been given as possible reasons for routinization status (also see Chapter III):

Service Applications and Outcomes

H_1: The innovation involved a core application
H_2: There was minimal competition among applications
H_3: There were service-related payoffs

External Environment

H_4: The innovation arose from crisis conditions
H_5: There was client support
H_6: There was community support

Internal Factors

H_7: There was administrative support
H_8: There was a single, active innovator
H_9: There was practitioner support
H_{10}: There were no adversary groups

Although such a standard outline allows for aggregate case analysis by facilitating comparisons across cases, it should nevertheless be remembered that the outline was imposed on each case and does not purport to cover the case information from every point of view.

All case studies were conducted during the winter 1976-77 and early spring 1977.

BIRMINGHAM FIRE AND RESCUE SERVICE
BIRMINGHAM, ALABAMA

Persons interviewed:

Assistant Fire Chief
Coordinator, EMS activities
Mayor of Birmingham
Executive Secretary to the Mayor
Two EMT-III instructors at the Regional Technical Institute (RTI)
Two dispatchers
EMT-III paramedic
Chairman of Birmingham EMS Committee and Alabama EMS Board
Member of Chairman's staff
Director of Emergency Services at University Hosptial
Fire Maintenance Bureau Superintendent

A. BACKGROUND

Birmingham is Alabama's largest city, with a population of approximately 350,000. The mayor is the chief executive and shares responsibility for governance with a nine-member city council. Some 30 independent municipalities surround Birmingham and bring the population of the metropolitan area to over 770,000.

The several steel mills and nearly 1,000 manufacturing establishments that fall within the city limits are the basis of Birmingham's reputation as an industrial metropolis. However, the city has also acquired a national reputation as an outstanding center for medical care. This is largely due to the growth of the University of Alabama medical complex, which has expanded rapidly in the past 15 years. The downtown area boasts many specialty hospitals, clinics, and medical training facilities associated with the university and, in addition, there are more than a dozen private hospitals within the city's borders.

The Birmingham Fire and Rescue Service (BF&RS) employs over 600 persons, approximately one-fifth the total number of municipal employees. The number of employees on the department's payroll has remained fairly constant over the past five years, and the budget has increased slightly. In 1976-77 the department's budget was $9 million, which represented roughly 10 percent of the overall city expenditures.

A distinctive feature of the BF&RS is the strong emphasis that departmental leaders place on professional development. Members of the force are actively encouraged to attend conferences and other functions aimed at improving services. In addition, BF&RS officials have assumed an active leadership role in various matters related to the fire service. For example, the current department chief will serve as next year's president of the International Association of Fire Chiefs. Similarly, the supervisor of the maintenance program recently served on a national panel that was convened by the federal government to develop recommendations for firefighting vehicles.

B. THE INNOVATION

The emergency medical services (EMS) program officially began in early 1973 with the purchase of a single emergency vehicle and the training of 17 firefighters to serve as EMT-IIIs (advanced level paramedics). The availability of funds from a one-year grant for an EMS pilot effort was directly responsible for the introduction of the service at that time. However, the impetus for an EMS program had been growing since the late 1960s, when an industrial accident drew widespread public attention to the shortcomings of the city's existing methods of dealing with emergency situations. In 1967, a furnace exploded in a local factory, spewing forth molten iron. Ambulances were called to the scene to transport victims to local hospitals, but of the 11 men who were burned, only 2 survived. Subsequent investigation indicated that the men might have been saved had appropriate on-site medical attention been available.

This incident, coupled with a growing dissatisfaction with the limited services provided by private ambulance companies, motivated the city council to issue an ordinance that established an advisory EMS committee. The committee was broadly based, with representation from such groups as the police department, the fire department, the Red Cross, the Heart Association, the Bar Association, and medical practitioners. The members were charged with keeping abreast of and making recommendations to the council with respect to the needs for emergency medical services in the city.

In 1969, the committee advised the council to join with surrounding municipalities to seek a $3.6 million three-year federal grant to establish an EMS demonstration project in the Birmingham metropolitan area. The council concurred and over 75 people were recruited to develop a proposal which outlined plans for: (a) the purchase of emergency medical vehicles for placement in fire departments, and (b) the training of fire personnel to operate the vehicles.

The federal government eventually decided against using Birmingham as an EMS demonstration site and rejected the request for funds. However, the process of developing the proposal had the secondary effect of generating support for a local EMS operation. Support intensified after a second tragic accident in 1972 that resulted in the allegedly preventable deaths of two young high school coaches. These events precipitated the city's 1973 decision to participate in a one-year pilot EMS program. The program was supported by federal money from the DHEW's Regional Medical Program, but at a level far below the $3.6 million originally anticipated. The $300,000 grant was used to purchase three emergency vehicles (one for Birmingham and two for neighboring municipalities), to develop and institute a training program for paramedics, and to pay a portion of the salaries of the fire fighters who temporarily left their posts to work in the program. Municipalities that participated in the program were required to offer matching funds.

The pilot program proceeded well and was transferred to local funds in 1974. The program has undergone substantial expansion in its four years of operation, and BF&RS currently operates six emergency vehicles (rescue units). Seventy-three men have received EMT-III certification. A team of two EMT-IIIs, comprised of a lieutenant and a firefighter, typically operate a vehicle (although occasionally there are three men on duty), and there are three such paramedic teams associated with each vehicle. The vehicles are equipped with an assortment of rescue apparatus in addition to radio and telemetric equipment that enables the paramedic

to transmit verbal and physiologic information about patient status to a hospital's emergency room. Two UHF channels have been reserved for rescue unit use, and communications between the vehicles and participating hospitals are coordinated through the department's communications center.

The BF&RS operation does not transport patients and therefore has not replaced the private ambulance service. A rescue unit responds to any call for help received through the communications center. Where necessary, a private ambulance is also dispatched to the scene. If continuous emergency care is required during transport to a hospital, an EMT-III will leave the rescue unit and ride with the patient in the ambulance.

There has been a steadily rising demand for EMS service in Birmingham. In 1975, nearly half of the 10,250 fire and other emergency alarms involved the EMS service. The program has attracted considerable public interest, and the fire officers are frequently asked to speak about their activities at public functions. In addition, the mayor recently made city funds available for the fire officers to begin a large-scale citizen training program in cardio-pulmonary resuscitation. The Birmingham EMS committee meets monthly and attracts the participation of about two dozen individuals in addition to the officially designated membership. The individual who heads the committee also serves as chairman of the state and national EMS committees.

C. STATUS OF ROUTINIZATION

Budget and Equipment

The Birmingham EMS operation was initiated with federal money funneled through a state agency. The operation was transferred to local funding in 1974 at the end of a one-year pilot period and has continued to be supported by city funds since that time. Thus, the innovation has survived three budget cycles. Expenditures for the program are not explicitly distinguished from expenditures for other BF&RS activities. The budget submitted to the mayor and council requests money for personnel, but there is no formal indication of what proportion of the requested funds will be used for the rescue as opposed to firefighting operations. This arrangement has enabled the fire department to maintain its established level of staffing while other city agencies have experienced sharp personnel cutbacks because of budgetary restrictions. Instead of reducing BF&RS funds in the same way as other agency funds, the council decided to maintain a stable level of funding for the BF&RS, with the expressed intent of encouraging the expansion of the EMS operations. In other words, rather than release "extra" officers who had been on the BF&RS's payroll, the council voted to maintain the existing levels so department staff could be redistributed to increase the number of paramedics in the city. This action has served to establish the EMS program as an essential part of the overall department operations.

The largest equipment expenditures in the innovation have been for EMS vehicles. In addition to the pilot vehicle purchased with federal money, the department received funding approval for the purchase of two additional EMS vehicles in 1974 and three more in 1976. Moreover, funds were allocated for a replacement vehicle in 1975, with the intention of using it as a substitute for the pilot vehicle,

which in turn has been held in reserve for use whenever any of the newer vehicles require maintenance or repair.

The other major piece of equipment used in the EMS program is the "Lifepak." It is used for transmitting data such as electrocardiograms (ECGs) via radio telemetry. Since the EMS program began, the original Lifepak has been succeeded by the more streamlined Lifepak-5. In 1977, the BF&RS requested funds to replace all its models with the newer equipment and expects little difficulty in obtaining approval.

Procedures for purchasing equipment and supplies for the EMS operation are the same as those used by the department for other operations. Requests are forwarded to a city purchasing agent who oversees the purchase and approves the transfer of funds to pay for the desired items. This is a routine procedure, but it requires considerable paperwork. However, the procedure has been made somewhat easier for the EMS program because the purchasing agent has taken an EMT-III course and is better informed of how the EMS program operates.

Personnel and Training

Seventy-six BF&RS personnel have received EMT-III status since 1973. All have completed a rigorous training program at the Regional Technical Institute (RTI) of the University of Alabama. This training program, which combines about 81 hours of classroom instruction in each level with approximately 450 hours of experience in the hospital wards, grew out of the pilot EMS program. The federal grant required the training program, and the medical director of the EMS committee took the initiative to develop the necessary curriculum. Seventeen firefighters enrolled in the pilot class, which subsequently became a standard course at RTI. Five groups of firefighters, ranging in size from 9 to 18 officers, enrolled in subsequent EMT-III courses.

Although only 48 of the BF&RS personnel who have achieved EMT-III status are currently assigned to one of the six EMS units, the department continues to permit firefighters to begin EMT-III training. This, in part, is due to the department's commitment to the EMS program. Agency officials repeatedly emphasize the advantages of having as many officers as possible trained in paramedic procedures. They also point out that this enables officers with firefighting assignments to better appreciate and thus cooperate with the officers on EMS assignments.

The EMS program has been deliberately structured so the paramedic assignment will not be a dead-end job. One paramedic and one lieutenant typically comprise an EMS unit. When the lieutenant is promoted to captain, he leaves the unit and thus creates room for others to move into the paramedic corps. This arrangement is important for routinization because it institutionalizes a procedure that allows individuals who are likely to be knowledgeable about and sympathetic to the EMS operation to enter the higher ranks of the department.

Birmingham operates under a civil service system. Any new position or job classification must be approved by the mayor before the salary is established by the civil service system. There have been two new job classifications created in connection with the EMS program. Shortly after the program was transferred to local funds, the job of paramedic was given civil service status. More recently, the department created and informally filled a full-time EMS coordinator position. Procedures are now under way to obtain a civil service designation for this job. (The

coordinating activities had previously been carried out by the assistant chief along with his other administrative duties.)

Any account of the EMS personnel would be incomplete without mentioning the role of the chairman of the EMS committee, an individual outside the department who oversees the EMS activities. The chairman has assumed responsibility for ongoing oversight of the level of medical expertise of the department's EMT-IIIs. He frequently requires them to attend special sessions to update or refresh their medical knowledge and skills. In addition, he has worked to establish a model EMT program at RTI that includes the BFR&S personnel as instructors and thus assures a continuing link between the medical and fire service communities.

Organizational Governance

The operation of the EMS program is not mandated by executive or legislative order, but there have been several directives that bear on its operation. The first was the creation by city ordinance of the Birmingham EMS committee. As was mentioned earlier, this ordinance assures continuing attention by prominent local citizens to Birmingham's needs for emergency medical services.

Other initiatives have come from the state and are primarily related to the training of EMS personnel. The state established an EMT-III licensing requirement in 1973-74 that is based on a state board examination. The state has also passed a law that requires all EMT-IIIs to attend a 40-hour refresher course every three years. In addition, the EMT-III curriculum is now mandated by the state board of health.

None of these initiatives has had a great effect on the EMS operation. This is largely because the chairman of the EMS committee is also head of the state EMS board, which plays a major role in developing the regulations in support of the legislative mandates. In effect, he has used the Birmingham operation as the model program on which the regulations are built. Yet, the regulations are important to the continued operation of the Birmingham EMS program. They assure that the groundwork in paramedic training laid by the current EMS committee chairman will be retained even if he were to cease being active in the Birmingham EMS program.

Within the BF&RS, there has been steady progress toward refining and standardizing the EMS operation. When the current EMS coordinator assumed his position in September 1976, there was a lack of uniformity in the various units' operations. A major responsibility of the new coordinator has therefore been to establish detailed standard procedures for all six EMS units. A special procedures bulletin is now issued each time there is an incident that points to some uncertainty or conflict in the current operations. Standard supply lists recently have been issued for all units. Careful records are now kept on the use of supplies by each unit; expendable items are restocked weekly.

D. REASONS FOR ROUTINIZATION STATUS

Service Applications and Outcomes

H_1 (core application): Although the provision of on-site emergency medical care was not a core function of the BF&RS when the EMS program began, it has

rapidly evolved into a central activity of the department. The importance of the EMS operation is reflected by the fact that nearly half of the calls answered by the department in 1975 involved the EMS program. Moreover, there has been an annual increase in the number of requests made for EMS aid. Another indication of the core status of the EMS operation is the department's stationery, which shows the formal title of the agency as the "Birmingham Fire and Rescue Service Department."

H_2 (competition): The different applications provided by the EMS program are highly compatible, with no opportunity for competition among applications. When the program began, it was decided that the vehicles would respond to all calls for help, no matter how large or small the "emergency." Because of this, the innovation provides a wide range of medical services. Rather than create competition among applications, the decision to operate in this way has resulted in more frequent use of the service by the public and appears to have broadened the base of support in the community.

H_3 (service-related payoffs): Although there have been no formal evaluations of the effectiveness or productivity of the EMS program in the BF&RS, the strong consensus among all respondents is that the program is an extremely successful and productive one. The consistent annual growth in the number of citizens using the service was cited by respondents as one measure of the program's success. Other indirect measures of service-related payoffs have been the mayor's decision to include continued support of the EMS program in his election platform, as well as continued press and constituency enthusiasm for the operation (see H_5-H_6, client-community support).

In addition to having payoffs related to the provision of needed services to clients, the program appears to have benefited the BF&RS in several ways. As a result of the EMS program, the BF&RS has gained greater visibility and status in the community. As one respondent pointed out, prior to the involvement in EMS, members of the public rarely had contact with the fire department and were likely to question how firefighters filled their time. The high level of service of the EMS program focuses attention on fire department activity as opposed to inactivity. Moreover, as was noted in the budget section, the EMS program has been largely responsible for a sustained level of budgetary support of the fire department at times when other local agencies were experiencing cutbacks.

External Environment

H_4 (crisis conditions): The EMS program was initiated in response to what was perceived as a chronic need of the Birmingham community—the need for immediate on-site medical care for victims of emergency situations. However, it is not obvious that this perceived need was strongly felt by the majority of community members prior to the onset of EMS activities in the city. Rather, it appears that those with reason to use or be familiar with the existing services were aware of the shortcomings of those services, while the public at large was only exposed to the limitations of the existing arrangements for emergency medical care when an incident was extensively covered by the media.

H_5, H_6 (client-community support): The EMS program enjoys widespread support from both private citizens and public officials outside the department. Each week, the department receives several unsolicited invitations from various citizen

groups to speak about the EMS operation. In addition, some groups have expressed a desire to contribute to the financial support of EMS; in one case, proceeds from a local group were used to purchase equipment for a vehicle. The mayor attributes his support of the program to the widespread public satisfaction it has elicited and, when running for election, included continued support of the EMS program as part of his election platform. Since he has been in office, the mayor has approved budget requests for the program and recently made additional funds available for the EMT-IIIs to begin a citizen training program in cardio-pulmonary resuscitation.

There are at least three factors that contribute to the public's enthusiasm for EMS. The first centers on the very nature of the services offered. The EMS operation provides needed and previously unavailable assistance during crisis situations. Unless such assistance were poorly administered (which is *not* the case in Birmingham, where the medical community clearly respects the level of competence of the EMT-IIIs), one would expect to find a high level of enthusiasm by those who had benefited from the service.

The second factor is the breadth and visibility of the operation. When one examines maps of Birmingham that show the number of emergency runs completed since the innovation's adoption, it is apparent that at least one household on every block in the city has used the service during any given year. Moreover, the department estimates that every family in the city will call in an EMS vehicle at least once in eight years. The appearance of any emergency medical vehicle, like that of a fire truck or police car at any location, attracts the attention of neighbors and passers-by, and thus the operation is highly visible.

Finally, community support has grown because of conscious efforts on the part of the BF&RS administrators to draw public attention to the EMS operation. Thus, when the first EMT-IIIs graduated, the stars of the television program "Emergency" were invited to Birmingham for the ceremonies. Similarly, the media are kept informed of any program activities that may be of interest to the public. Only one article critical of the program has appeared since the EMS program began, and the public outcry was so intense that the paper re-examined the incident and subsequently retracted the critical comments.

Internal Characteristics

H_7 (administrators): The EMS program has enjoyed the strong support of administrators in the fire department. The chief has been enthusiastic about the program, and the most active proponent the administrator with rank second only to that of the chief. The assistant chief has put a premium on the medical training of the paramedics and arranged for release time for the trainees during the most demanding six months of the EMT training program. He did this because he was convinced that the continued success of the EMS program was inexplicably tied to the quality of medical treatment provided by the paramedics. His notion was that well-trained fire practitioners would draw support from both the medical community and the public, whereas mediocre paramedics would antagonize both.

In addition, his high rank has enabled the assistant chief to have direct access to key individuals outside the agency, such as the mayor or hospital administrators, whose decisions have directly affected many aspects of the EMS operation. Thus, the assistant chief has been in a position to discuss budget priorities with the mayor on a casual basis and to arrange a reciprocal training agreement with the hospital.

H_8 (innovator): Until September 1976, when a special EMS coordinator's position was designated and filled by a captain in the department, the EMS activities were coordinated by the assistant chief, a man who appears to command the respect and support of department administrators and practitioners.

From the outset, the assistant chief viewed the EMS operation as a means through which the BF&RS could provide the community with vitally needed services and thus enhance the importance of the fire department as a whole for the community. As a long-time and skilled administrator, he acted in a cautious but deliberate manner to assure that the EMS operation continued to meet the ambitious expectations held for it from its inception. For instance, he carefully screened the first group of practitioners for personality traits that would lend themselves to building rapport in the community as well as for the intellectual abilities necessary to meet the EMT-III training demands. He also decided that only firefighters with at least four years of experience would be permitted to enter paramedic training, thus enabling the selection of seasoned firefighters who would be likely to work well with non-paramedic colleagues. These decisions appear to have contributed to the continued enthusiasm for the EMS service.

H_9 (practitioners): EMS is a distinctive innovation in that its operation relies on the coordination of efforts by practitioners from more than one local agency. For the innovation to be successfully routinized, practitioners from both the fire service and the cooperating medical facilities must come to view EMS as part of their "normal" practice.

This has been the case in Birmingham. On the one hand, the practitioners from the fire department who are involved (the EMT-IIIs) typically consider it a privilege to serve in the paramedic corps. All are firefighters who have volunteered for the paramedic service, and there have consistently been far more applications for the paramedic jobs than there have been positions available. The large number of applicants has enabled department officials to screen potential paramedics carefully for ability, commitment, and other characteristics they believe to be associated with quality service.

On the other hand, coordinators of the EMS program have given careful attention to the need for health practitioners (i.e., nurses and doctors) to understand the nature of the field operations. Thus, emergency room nurses who communicate with paramedics in the field are encouraged to spend time answering calls with an emergency medical team so they can become fully familiar with the EMS operation. This not only helps the nurses understand the conditions under which the paramedics operate, but also enables the nurses to build rapport with the paramedic staff. Similarly, the paramedics conduct rounds at various hospitals in Birmingham, thereby allowing the hospital staff to be exposed to and gain confidence in the level of competence of the paramedics.

H_{10} (adversary group): There appears to be little personal opposition and no organized opposition to the EMS operation from the BF&RS staff. On the contrary, the innovation appears to have brought prestige to the department that benefits the entire staff. The staff for the EMS operation is selected from volunteers among the regular firefighters, and thus the officers serving as paramedics have been working colleagues of those responsible for the firefighting operations of the department. The paramedics receive a slightly higher salary than that of the regular fire fighters to compensate for the responsibilities they assume and the larger number of calls

to which they respond but the difference is sufficiently small that resentment on the part of the firefighters is unlikely.

The only resistance to the EMS from the community derives from the private ambulance companies serving Birmingham. Although the companies do not operate as an adversary group per se, their existence has to some extent restricted the EMS operation. The fact that the inclusion of patient transport in the EMS operation would have interfered with privately owned businesses influenced the initial decision not to provide transport services. Despite sporadic dissatisfaction with the quality of service provided by the private companies, the BF&RS administrators have been reluctant to expand their operation to include transport as well as on-site treatment of patients.

CINCINNATI POLICE DIVISION
CINCINNATI, OHIO

Persons interviewed:

Lieutenant, Commander of CPD Traffic Bureau
Police Officer, CPD Traffic Bureau
Instructor, Regional Training Academy
Police Officer, Office of Program Management, CPD
Coordinator, Alcohol Safety Action Program,
Department of Safety

A. BACKGROUND

The city of Cincinnati is governed by one of the oldest council/manager systems in the country and has a single department of safety containing both police and fire services. Although the city's population has declined from a peak of 502,550 in the late 1960s, the Cincinnati Police Division (CPD) has slowly expanded from 906 positions in 1970 to its present complement of about 1,000 sworn officers. CPD administrators have continued to seek improvements in the agency's operations and have implemented such new systems as team policing, a regional crime information center, decentralization of support services, and a building program for several new stations. A growing agency budget has supported many of these changes, as has the receipt of large amounts of federal assistance. For example, the agency budget in 1975 was $22 million, an increase of $4.1 million over the previous year; additional funds were made available through the LEAA and the National Highway Safety Administration.

The decentralization of the CPD and reorganization of operating units have been the major focus of the division since 1969. In that year, the CPD began regrouping sections and bureaus. The following year, consolidation reduced the number of districts from seven to six. In 1975, consolidation again reduced the number of districts to five and established the new position of assistant chief (to coordinate all bureaus). Also created that year was the operations bureau, which included almost all of the field operations, such as criminal investigation and traffic. The new bureau had a budget of over $13 million and had 75 percent of the CPD assigned to it. The reorganization had a major effect on the traffic enforcement program, for the previously separate traffic section was first placed under the operations bureau and then totally decentralized to all of the five stations.

In 1976, the CPD suffered a major disruption when the chief of police, who had been in office for five years, and several other top administrators were indicted. This created a large turnover in personnel and altered the direction of the agency.

B. THE INNOVATION

In 1970, the traffic section began participating in the federally sponsored program "Fatal Accident Reduction Enforcement" (FARE). In 1971, Cincinnati was selected as one of the 35 national test sites for the newly conceived Alcohol Safety Action Program (ASAP); the city was awarded $2.1 million to cover the costs of the project for 1972-74. Included in the grant were funds to purchase three breath

testing instruments (Breathalyzers), ten patrol vehicles, and salaries for ten officers and two sergeants. The extra funding was a substantial boost to the more informal FARE program.

During the three years the ASAP was active, the CPD had ten officers and two sergeants assigned to the project. There were another 15 men in the traffic section headquarters to assist regular CPD officers in accident investigation and in the processing of DWI cases. The 12 ASAP officers would handle virtually all of the DWI arrests, responding to the scene at the request of regular patrol officers. When the project was terminated, the 12 ASAP men and the other 15 support officers were reassigned to the various district stations.

Under ASAP, patrolling officers would arrest a driver for a traffic offense and, if there were reason to suspect the driver, for DWI. The driver would be taken to the traffic section offices to be processed. The station was equipped with three Breathalyzers running 24 hours a day. The driver would be asked to take a breath test; if he refused, then the state's "implied consent" law required that he forfeit his license for a period of six months. The Breathalyzer operator would read the suspect his rights, including his right to refuse the test, and would then ask the person blow into a small tube attached to the instrument.

While the sample was being processed, the officer proceeded to interview the driver, using the *Alcohol Influence Report* as a checklist. The results of the breath test were noted on the form and the case was forwarded to the prosecutor's office.

When ASAP first started, the CPD intended to videotape all offenders during the testing and interviewing. The grant enabled the CPD to purchase two video cameras, three recorders, and three video monitors; all equipment, except for one monitor in the prosecutor's office, was kept at traffic headquarters. But the videotapes were less than satisfactory. First, the tape was effective only if the subject was moving around. Second, the conviction rate, even without the tape, was 85 to 90 percent. Third, the whole trial usually took only 15 minutes—the same amount of time it would take to play back the tape. Finally, the judges objected to the tape being used in some cases but not in others. Not surprisingly, the CPD phased out the videotapes in 1973, after having used them several times in court.

The Breathalyzer itself represented a major change for the traffic section. Previously, all offenders had to be tested by urinalysis, which took a great deal of time and was sometimes ineffective. Although the ASAP grant specified only that the program would use breath testing in place of urinalysis, the choice of instrument was left to the jurisdiction. With the Breathalyzer, an offender of either sex could be tested in a few minutes and could not give the excuse of being unable to provide a sample. The Breathalyzer also removed the need to involve the city chemist in each incident and trial.

In 1976, the Ohio Department of Transportation approached the CPD with an offer to help purchase any additional breath testing instruments. The CPD had wanted to acquire several additional instruments for two years but could not get the administration to allocate the funds. The state offer of 50-percent reimbursement was a strong incentive, and so the traffic section was able to get five Breathalyzer 900-As.

Today, the traffic section utilizes all eight instruments. The original three instruments are used at the regional police academy for training and as backup for the other five. The five new instruments are located in each of the five station

houses and are kept in a secured room under the supervision of a sergeant at each station. There are 139 trained operators spread throughout the districts and over the shifts to handle all testing.

C. STATUS OF ROUTINIZATION

Budget and Equipment

From 1972-74, the Breathalyzer operation was funded from the $2.1 million federal grant. These costs included the purchase of the first three instruments, salaries for ten officers and two sergeants, overtime pay, ten patrol vehicles, and supplies. As with most federal grants, there had to be matching local funds; however, these funds were allocated for the whole project and not just for the innovation. When the project was phased out, the CPD assumed the continuing costs: the 12 men who were on the project and who were originally on the division payroll were put back on the payroll, overtime was budgeted but at a much lesser amount, and regular CPD vehicles were utilized. The annual cost of supplies for the Breathalyzer was incorporated as a part of the regular CPD supply budget.

Similarly, the five new instruments purchased in 1976 were paid for with local funds. Although the state was to reimburse the city for 50 percent of the cost of the instruments, the CPD had to cover the full amount (five Breathalyzer 900-As at $1,000 each including simulator = $5,000) in its own budget. The state reimbursement funds went to the city treasury and not to the CPD. However, because the instruments have been purchased, the annual costs of the innovation are relatively small compared to other supplies and especially to personnel costs. Test ampules cost $.70 each; the costs for other supplies amount to a few hundred dollars more per year. Thus, budget cutbacks similar to those that have already occurred do not affect the innovation directly. It should also be noted that in 1976 the CPD went through an economy program in which 94 men were laid off and large cutbacks were made in all budgetary categories.

The low operating costs for the Breathalyzer have meant that the city has been able to save money on expensive chemical analysis of blood, urine, or saliva. These tests, done by the city chemist and his staff, required a full-time assistant and overtime for the long hours spent testifying in court. Thus, the purchase of the instruments has been from soft funds, first from federal grant money and later from discretionary division funds. But the annual operating costs have made the necessary passage from the federal money to regular department funds, even though Breathalyzer supplies are not a separate line item in the annual budget. In both purchasing cycles, the initiative was from outside the division and the choice of instruments was constrained by the state.

Purchasing specifications and procedures, as well as the procedures for budget preparation, have remained unchanged by the use of the Breathalyzer. The purchasing specifications, prepared by the traffic section commander, were simply those listed by the manufacturer or the terms of the state grant. The purchasing procedures are the same as for any other piece of equipment: the maintenance technician calls the chief's office to request that the supplies be purchased, the chief's office fills out a purchase requisition and forwards it to the city purchasing office, and the supplies are ordered.

Personnel and Training

Breath testing requires the presence of a trained operator to calibrate the instrument, process the breath sample, and perform any maintenance/repair procedures necessary. The division currently has 130 trained operators to run the five instruments; three of the operators are in the traffic section and the rest are distributed throughout the five stations. All but eight are senior operators, meaning they are capable of running breath tests and of doing all the maintenance procedures. The other eight will be trained as senior operators in the near future.

In the CPD, the operators are regular division officers who have undergone a 40-hour training period and have been certified by the state board of health. In 1972, the state board came to the division to train the operators in a special 80-hour course on the instrument, its repair, and the videotape system. As turnover occurred among the 12 operators, the new officers would be sent to the regular training programs sponsored by the state board in Columbus. The state provided the training free of charge.

As the end of the ASAP grant drew near, the division realized it was going to need a larger number of part-time operators to substitute for the full-time ASAP officers. It was at this point that the CPD internalized its training program. The CPD made a request to the state board of health instructor that it be allowed to establish its own training program just for Cincinnati police. The state agreed, and in 1975 the division started to train senior operators at the regional police academy. The training has been available to all law enforcement agencies in Hamilton County. Classes of up to 24 officers have been trained as the need has arisen, which has usually been three or four times a year.

The officers to be trained have been chosen from among those who have volunteered and there has usually been a short waiting list. The course used at the academy was developed by the state board and is mandated as the course of instruction. The instructor can design his own schedule and can add extra material, but he must follow the state's outline and materials. The state supplies only 24 copies of "Basic Training Program for Breath Examiner Specialist" to be used by the students and returned at the end of the course. The instructor is also given an "Instructor's Lesson Plan" to follow.

The Cincinnati instructors have tried to give the officers as much material as possible on the Breathalyzer. The current book for the course is a revised edition, which is not as good as the original from the CPD's viewpoint. It covers only the instrument and does not discuss the history or principles involved in chemical testing. Therefore, the division assumed the task of reprinting the original text for the course, and it now provides each operator with his own copy. In addition to the old manual given the students, the new manual loaned to them, and the oral instruction, the students also receive other instructional materials: handouts on the CPD's procedures, federal rules governing DWI arrests, and recent court decisions.

The title of "operator" or "senior operator" is not connected with the CPD's or city's civil service system, i.e., it is not a formal CPD classification or rank. Instead, the title is conferred by the state board of health after the officer has taken the course and passed the certifying examination. At the end of the 40-hour course, an examiner from the board comes to the class to give each student a written and practice test. Upon passing the examination, the officer is certified as an operator for a period of two years. The title and the examination process existed in the state

prior to the implementation of the innovation in Cincinnati. At the end of the two years, the operator must take another certifying examination. To prepare for the examination, the operator returns to the academy for an eight-hour refresher course focused on the state's textbook. At the end of the course, the examination is given by the state examiner. Those who pass are recertified for another two years; those that fail are sent for training in the next class. In addition to the recertification examinations, the state also gives each operator an annual proficiency examination. The state examiner will give the officer a solution with an unknown alcohol concentration and ask the operator to test it. As the operator runs through the steps, the examiner checks them off his list and verifies the answer.

By setting up its own training program, the CPD has internalized its own training staff as well. The instructors for the course are employed by the agency or other government offices. Thus, the CPD no longer relies on an outside agency for its training. New operators can be trained as the need arises by in-house staff using the CPD materials; refresher training can be handled in a similar manner.

The innovation has consequently been operated for five years without the need to bring in specialized personnel. All operators have been regular CPD officers and almost all have received their necessary training while in the agency. The Breathalyzer has also been a sufficiently simple and self-contained instrument that little external technical assistance was necessary. State board officials helped to design the training program and conducted the early training, and federal National Highway Safety Administration (NHSA) representatives provided information on the instrument. The city chemist has helped to explain the nature of the chemical testing involved and has served as an "expert" in establishing the validity of the Breathalyzer. However, such assistance has been mainly administrative in nature; the technical problems have been handled entirely on an internal basis.

Organizational Governance

The intensive ASAP program prompted the revision of the CPD's *Procedure Manual* to include five pages of procedures for handling DWI arrests. These procedures delineate the steps to be followed from the time of arrest until appearance in court, but do not include a detailed discussion of how to operate the Breathalyzer. The procedures specify that all alcohol safety unit personnel must be senior operators to use the Breathalyzer and video equipment. Also required is the use of the Breathalyzer "operational checklist" whenever a test is being conducted. Because the procedures specifically mention the videotaping, it appears that the manual has not been revised since 1973 when the taping was last done. A note in the manual, however, indicates that a supplemental information bulletin from the chief authorized elimination of the videotaping.

The use of the Breathalyzer has also necessitated the revision of one CPD form and the adoption of a state form. The division uses an *Intoxication Report* form to record the findings of the psychomotor tests, information on the driver, and the results of the chemical test. Prior to the innovation, the form did not include space for recording information on breath testing. Since the adoption of the Breathalyzer, the form has been revised to include the time, date, operator's name, and instrument used to conduct the breath test. The form specifically names the Breathalyzer, although there is also space to indicate if another kind of chemical test was used. The state board of health also requires that if the CPD is going to use the Breath-

alyzer, it must test the instrument for accuracy at specified intervals. Each time the Breathalyzer is calibrated (which must occur after every ten tests or nine days), the operator must fill out a state *Breathalyzer Test Report.*

Ohio state law supports the use of breath testing in the prosecution of DWI incidents, but does not mandate its use. The law simply requires that a person arrested for DWI must submit to a chemical test of some kind or automatically forfeit his license for a period of six months. Chemical tests are permitted on blood, urine, breath, or saliva. It is up to the local jurisdiction to decide which test is to be used, as long as the testing instrument has been approved by the state board of health.

Cincinnati has no formal policy insisting that only the breath test will be used. The Breathalyzer is generally used but its selection may be tempered by the situation, e.g, an unconscious driver cannot give a breath sample. However, the training, procedures, and supervisory process clearly emphasize the breath test.

The Cincinnati police are not represented by a regular union in labor negotiations, therefore the innovation has not been part of any collective bargaining.

Maintenance and Repair

Traffic section personnel maintain and service the Breathalyzers. If the instruments cannot be repaired, they are sent to an outside company to be serviced. All senior operators are capable of making repairs but experience has proven that the best results are obtained when a minimum number of persons are involved, to reduce inconsistent treatment of the equipment.

If an operator accidentally spills acid on the instrument, he will immediately disassemble and clean the instrument. Otherwise, if an instrument needs attention, the operator will call the traffic section to send over a replacement. Ninety percent of the repairs can be done on the scene, while the other 10 percent are done at a work bench in the traffic section. The section has spent about $300 on spare parts, and one technician has supplied his own tools for the repair operation.

The innovation has replaced one type of chemical testing with a newer, more convenient type. As such it has not replaced any of the old functions for the traffic section nor has it changed many of the procedures. The changes that have been made, e.g., assigning DWI enforcement to ASAP or the decentralization of manpower to the districts, have been the result of administrative reforms separate from the innovation.

Except for the videotape system that was used for two years and then dropped, the equipment involved in the innovation has essentially remained the same since implementation. The Breathalyzer instrument and its accompanying simulator are the basic components of the innovation. They are both self-contained, and there is almost nothing that can be done to modify their operation. The five new Breathalyzers purchased in 1976 were an updated model (but not second generation) of the three purchased in 1972; the primary differences was that the newer models had a 90-second timer. The other characteristics of the instrument were otherwise identical.

D. REASONS FOR ROUTINIZATION STATUS

Service Applications and Outcomes

H_1 (core application): The innovation has made several important changes in the processing of DWI arrests in Cincinnati. First, it has replaced urinalysis with breath testing as the primary chemical test. Second, it allows the chemical test to be done at the police station at the time of booking instead of being done several days later at a city laboratory. Third, it allows the officer/operator to perform the test himself rather than relying on a chemist in another city agency. Fourth, it replaces a several-step analytic process with a single-step instrument. Finally, it makes the DWI processing much easier for the officer by eliminating the problems of excuses, special procedures for female offenders, absence of facilities, or handling of specimens.

H_2 (competition): The innovation has only one application in the CPD: to test breath samples of drivers arrested for DWI. Establishment of priorities and resource allocation are thus not important issues.

H_3 (service-related payoffs): The benefits from the innovation have been derived first and foremost by the arresting officers. They can process a DWI case within 15 minutes and have all the information they need to complete their reports. Time for processing the case and court time per case have been reduced. Overall, however, court time appears to have increased for the officers because of the larger number of arrests.

At the same time, the larger number of arrests and convictions has also benefited the CPD, the prosecutor's office, and the city population. The CPD can point to the number of arrests as evidence of more effective job performance. The prosecutor is able to spend less time per case because the results of the Breathalyzer test are more easily understood by a jury and are accepted by the court as proof of impairment. The conviction rate with the urinalysis procedure was only about 5 percent less than with the Breathalyzer (90 percent), but the number of cases processed was only about 600, compared to the 3,000 currently being handled. The city also benefits from the extra revenue brought in by the cases and from a declining rate of deaths from vehicular accidents.

There has been at least one formal evaluation of the innovation during its operation. It was carried out in 1974 as a part of the ASAP evaluation done by the Institute of Governmental Research at the University of Cincinnati. Although most of the report dealt with arrest strategy and ASAP performance, it did identify specific payoffs of the Breathalyzer. In addition, successive roadside surveys in 1973, 1974, and 1975 found that there had been a reductionn of 42 percent in the number of drivers on the road with a BAC of .10 percent or higher as a result of the ASAP enforcement.

However, the innovation has not been without problems. The Breathalyzer has made the arrest procedure simpler; consequently, more arrests are being made. The increased arrests, however, mean that the officers must spend more time in court and less time on the street. During the ASAP operation, the 12 officers would often spend all day in court and all night patrolling, with little time left to rest from the workload. Court time is also expensive for the division, because each officer must be given a minimum of three hours compensatory time for every occasion in which he goes to court. The increased workload therefore indirectly incurs greater costs.

The excessive court time also has a drawback for the officers. Many of them do not like to spend time in court. Others find that after they have been in court a few times, they are perceived by the attorneys as "experts" and are singled out for extra questioning. With the long hours and difficult experiences in court, many of the men have shied away from DWI arrests and from volunteering to become Breathalyzer operators.

External Environment

H_4 (crisis conditions): Prior to the innovation, Cincinnati was facing a twofold problem with respect to drunken driving. The state had estimated that there were over 25,000 problem drinkers on the road in the metropolitan area, many of them well over the impairment level of .10 percent BAC. Most of the 30,000 automobile accidents the city experienced every year involved the use of alcohol. But to combat DWI, the CPD had to rely on the commitment of the officers and the lengthy procedures of the urinalysis, and only 500 to 600 arrests were being made each year. Most of the respondents agreed that the CPD would have implemented the Breathalyzer eventually, but it would not have been on nearly the same scale or with the same commitment. The impetus for the innovation's use really came from outside the agency. It came from the federal government though the ASAP program and through the state highway operation. Both parties recognized the service need in Cincinnati and were able to put the resources into meeting those needs.

H_5, H_6 (client-community support): The innovation is entirely limited to the internal operations of the local government and police agency; there are no "clients" per se in the community to support the innovation. City park police use the Breathalyzer as needed and, in theory, other cities in Hamilton County (outside of Cincinnati) can also make use of the instruments. It is unlikely, however, that there would be any kind of organized support for the innovation if the CPD discontinued it.

The only enthusiastic supporters outside the local government have been the Institute of Governmental Research, the state board of health, the state department of transportation, and the NHSA, all of which have been extensively involved in the several enforcement programs. There is general support from the community, but it is directed at the overall enforcement program and not merely the innovation. It appears that the community would express little opposition to the removal of the Breathalyzer as long as the accident rate did not increase.

The amount of publicity for the innovation has been steadily declining since it was first introduced. The federal government gave extensive publicity to the ASAP project in 1972 and to the fact that Cincinnati was a test site. The state has also publicized the fact that there are special teams of officers patrolling the highways for cases of DWI. Local coverage, which appears primarily around holiday time, focuses attention on both the enforcement program and the Breathalyzer itself. The heavy publicity initially given to the program was intentionally reduced as the backlog of arrests grew. The division has attempted to maintain a public awareness of the program to serve as a deterrent to DWI. Because the deterrent factor comes from the possibility of arrest and not from the Breathalyzer itself, little emphasis is placed on the instrument. The traffic section still feels that over half the potential DWIs know about the innovation and about the enforcement program.

Internal Characteristics

H_7 (administrators): The innovation has received continued support from the top administration in the CPD. One sign of support on the part of the chief has been the continuation of the innovation after federal funding stopped; the chief approved the funding of officer overtime and the expenditures for instrument supplies. In addition, the chief reallocated $5,000 in discretionary funds to acquire five more instruments, approved the continued training program, and authorized release time for the training of officers.

There is also strong support and awareness for the innovation from other parts of the Cincinnati government. Six of the nine city council members are familiar with the Breathalyzer and four showed strong backing for the ASAP program. At one point the mayor (elected from the council) was very supportive of the enforcement program and the innovation; the current mayor, however, has little awareness of the instrument. Eleven of the 13 judges in the municipal court readily accept the use of the Breathalyzer and feel it has been very helpful in processing DWI cases. Even defense attorneys have come to accept the results of the breath test, while the assistant prosecutor has gone so far as to become a trained senior operator.

H_8 (innovator): Although the commander of the traffic bureau has responsibility for the coordination and supervision of the innovation, the role of innovator is actually shared by several officers in the bureau. The commander provided the initial thrust for the use of the instrument and its procedures but then quickly involved the officers in the implementation and problem solving. For example, the revisions made in the "Intoxication Report" resulted from the suggestions of traffic officers that information frequently requested in court be recorded directly on the form. Similarly, the changes in the *Procedure Manual* were developed by the officers based on their experiences. These changes were then officially instituted by the program management section.

Technical expertise is also shared by the bureau officers. All have been trained to repair and maintain the instruments; however, to minimize inconsistent repairs to the instrument, one of the officers has been designated as the primary technician. As such, he is responsible for making the weekly or monthly repairs and for much of the preventive maintenance. The technician also provides instruction on the use of the Breathalyzer at the academy and frequently handles the scheduling of classes, ordering of materials, etc. Often these various responsibilities are rotated among the other officers so that everyone remains familiar with each aspect of the operation. Thus, it appears that the innovation has been supported by multiple innovators under the coordination of the commander and that it has not developed a dependency on any single officer.

H_9 (practitioners): The innovation is not relevant to the officers' career advancement, and there is no monetary incentive system for becoming involved in the enforcement operation. All operators maintain their regular CPD rank; they must take the civil service examination for any promotions and are not given special consideration as a result of being Breathalyzer operators. Operating the instrument does not interfere with the other duties or experiences of the officer and, therefore, is not a handicap in the promotion process. Because the CPD views the skill of operating a Breathalyzer the same as any other technical skill of the officers, e.g., marksmanship, there is no extra pay associated with the title of operator.

Among those officers who had processed DWI cases using urinalysis, there was ready acceptance of the new instrument. However, other officers (particularly the older ones) showed some resistance to the extra time involved in the training and the additional demands of court appearances. As the men learned about the heavy workload entailed, the list of volunteers diminished. For the most part, the only reaction to the innovation itself has been either positive or neutral.

H_{10} (adversary group): There are no groups within the local agency that oppose the innovation or that would support a substitute.

DALLAS FIRE DEPARTMENT
DALLAS, TEXAS

Persons interviewed:

Chief, Ambulance Division
Chief, Dallas Fire Department
Chief of Operations Division
Chief, Planning and Research Division
Lieutenant, Ambulance Division
Two Paramedics, Unit 11
Cardiologist; Chairman, Training Committee, EMS Program; Assistant Professor, Medical School, University of Texas; Member, State EMS Committee
Surgeon; Member of the Training Committee; Associate Professor, Medical School, University of Texas
Registered Nurse; Member, Training Committee, EMS Program; Director of EMS Research
Member of State Department of Public Health; Director of Training, EMS Program
Member of State Department of Public Health; EMS Skills Instructor
Budget Officer, Office of Management Services, City of Dallas

A. BACKGROUND

Dallas is a "low-rise" city composed of about 340 square miles and a population of about 912,000. In contrast to many of the rapidly expanding cities in the Southwest, Dallas has experienced a relatively stable population and geographic size over the last decade, although there has been some annexation of the many small, independent enclaves within the city boundaries. The economic and tax base of the city has also been stable for several years, allowing for moderate growth in construction and services.

Although the city is headed by a mayor elected from an 11-member city council, the day-to-day administration is handled by a strong city manager and staff. In FY 1977, Dallas operated on a budget of $307,420,000 (including revenue-sharing funds) of which $30,676,000 (10 percent) was allocated to the fire department. Current city manpower is approximately 13,000 employees, of which 1,400 (11 percent) work in the fire department. All of these employees are covered by a city-wide civil service system; all hiring and promotions are done solely by examination plus an efficiency evaluation by the supervisor. For the most part, the system is very competitive.

The Dallas Fire Department has fared better than most city agencies. The overall budget for fire protection has been increasing at a gradual rate over the last several years, and some new fire stations have been built. In mid-1976, the department underwent a major turnover in its top administration. The chief, who had been in office for six years and who was a part of an administration that had been in control for over 30 years, retired and was replaced by a division chief from within

the ranks (the planning and research division). At the same time, several other top positions opened and were filled from within the ranks, including the chief of operations and the chief of planning and research. Whereas the previous administration was very "closed" in its attitudes toward personnel matters and operations, the new administration has actively tried to confront many of the department's longstanding problems. This has changed the internal atmosphere from one opposing new ideas to one encouraging experimentation and open discussion.

B. THE INNOVATION

Throughout the 1960s, Dallas contracted biennially with one of the several local funeral homes to provide emergency ambulance service. The contract was written on an annual basis. The primary contractor then subcontracted with other funeral homes around the city to operate the ambulances. Calls for emergency assistance would be received by the police; the police would then call the primary contractor to dispatch the ambulance. Equipment on the ambulances was minimal and the attendants' main function was simply to transport people. The contractor would charge the patient $32.50 per trip, and the city agreed to pay the contractor 80 percent of that if the contractor could not collect from the individual. In essence, the city was subsidizing the contractor to provide the service.

Three groups gradually became dissatisfied with the service: the public was upset about the slow response time (over 10 minutes on the average), the doctors were dissatisfied with the level of prehospital care, and the local politicians and media were distressed by the numerous citizen complaints. During this time, the fire department maintained a neutral stand, although some officials did expect to eventually get involved in the provision of ambulance service.

In 1969, an ambulance committee was formed, consisting of representatives from the city council, the mayor's office, Southwestern Medical School, Dallas Hospital Council (representing the 34 hospitals in the area), the Dallas County Hospital District, and others. Much of the impetus for organizing the committee came from the Dallas County League of Municipalities. The size of the committee prevented it from working effectively, and so in early 1970 the league asked a consulting firm to study the problem. The consultant's recommendation was a county-wide system of emergency medical services (EMS). If that was not possible for political reasons, then Dallas was: (a) to regulate private ambulances directly, (b) to set up its own EMS program, or (c) to transfer the ambulance service to the fire department.

The political environment precluded the county-wide system. At first, the city tried to get the surrounding cities in the county to cooperate in an EMS program. This failed because these cities already had a program of their own or they were not experiencing service problems. Although the cities did agree to a one-dollar charge on license plate fees to support a county-wide system, opposition from truckers and funeral homes killed the proposed bill in the 1971 legislature.

The defeat of the bill forced the city to look elsewhere for a solution. The city manager and council finally decided to put the EMS program in the fire department because: (a) it had the physical plant to take care of the equipment, (b) it had a full-time core staff, and (c) the record of fire department's EMS service elsewhere (e.g., Baltimore, Miami) was good. The assistant city manager and several council members made site visits to other cities to view their EMS operations.

To prepare for the transition to an EMS system, the chief assigned a member of the department's research and planning staff (who later became the head of the EMS program) to develop the budget and procedures for the service. Based on additional site visits but very little available EMS literature or other outside help, a proposal was drafted. Private ambulance companies had been responding to about 68 calls per day according to police records, and so the demand for EMS was projected higher, at 85 per day. With a response time of six to eight minutes as the overriding constraint on system design, a computer simulation was used to estimate the number and location of EMS vehicles. The computer simulation model was a cooperative effort of the fire department, the city office of management services, and the data processing division. The results indicated a need for 16 Mobile Intensive Care Units (MICUs) with an additional six units in reserve.

The recommendation of the department to the council was for a first-year budget of $423,187 for EMS. That amount was increased to $600,805 during negotiations to include: 22 vehicles, $96,696 for salaries, increases for clothing and travel, and additional funds for tools and chemicals. The vote approving the budget was five to four. However, when the department went back to the council for approval of the type vehicle to be purchased (prior to the bids going out) the program was again in doubt. The council was divided five in favor of fire department operation, five in favor of private operation, and one—the legal counsel of the funeral home which was a subcontractor—abstaining. After several weeks the vote finally shifted to nine:one:one and passed in January 1972. The medical community had lobbied behind the scenes in favor of the new service.

The EMS system began in October 1972 with 150 EMTs. Two were assigned to each MICU for each shift, with the remainder assigned to various engines. The system was headed by a division chief for EMS, and it was part of the ambulance division (one of nine fire department divisions). The EMTs had been trained in five classes, with each class completing a 176-hour course, and the EMTs were qualified to perform advanced first aid and to prepare an emergency patient for transport.

From the beginning, however, the division chief had planned to upgrade the system to include the use of paramedics. Rather than doing everything at once and risking failure, the first concentrated on the implementation of the ambulance service. In January 1974, the second phase of the program was initiated with the training of 120 paramedics from the existing EMTs. Life support equipment (Amb-paks), telemetry equipment, and drug kits were purchased to upgrade the ambulances to fully equipped MICUs. There are currently 160 EMTs and 138 paramedics. Most are assigned to the 17 active (plus six reserve) MICUs with some EMTs assigned to engines. All the officers, like regular fire officers, are located in stations throughout the city and work in 24-hour shifts with 48 hours off between shifts. Each MICU has a squad of two firemen, one of whom is a paramedic and the other being a trained EMT.

Each MICU contains a great deal of sophisticated medical and communication equipment. A portable amb-pak contains an electrocardiograph, an oscilliscope, and a defibrillator. A portable five-channel radio can be attached to the Amb-pak to transmit ECG information to a radio receiver in the hospital base station. A drug kit contains a variety of medications for use in reviving heart attack patients, as well as other medications used for tending to accident victims. When the unit arrives at the scene, the two men carry the necessary equipment to the patient and

begin to give care. Because the exact nature of the call is not always known, the men must carry most of their equipment with them each time; the equipment packages can weigh as much as 60 to 70 pounds, which makes them bulky to carry.

At the scene, the paramedic decides whether the patient needs to be transported to a hospital for further treatment. If it is not an emergency, the patient is told that he must find his own transportation to the hospital. If it is an emergency and the patient refuses to be transported, he is asked to sign a statement to that effect. There is a $40 charge to anyone transported, but on-site case is provided without charge. From the time the MICU arrives at the scene until the time it arrives at the hospital, the paramedic is in constant voice contact with the physician at the hospital base station. All voice contact and telemetry is recorded by the fire department dipatcher and by the base station for reference.

C. STATUS OF ROUTINIZATION

Budget and Equipment

The budget for the EMS operation has increased each year since its implementation, from $600,805 for FY 1971-72 to $1.6 million in 1974-75 to $2.1 million for 1976-77. The passage from external to local (i.e., soft to hard) funding occurred in 1972 at the same time that the program changed from its start-up phase to its operational phase. The initial funds in FY 1971-72 had been part of the city's revenue-sharing money for that year; the funding from the following year, however, was totally from the city's general fund. The program has continued to operate on local funds since then, although revenue-sharing funds were used again in 1974 to pay for the new telemetry equipment for the paramedics.

It should be noted that the EMS program generates some revenue for the city—but the revenue does not directly benefit the program. The city charges $40 to tranport a patient to the hospital regardless of the distance involved (generating approximately $400,000 in revenue annually). The city also contracts with neighboring cities who wish to participate in the telemetry link to one of the hospitals. There are currently three communities that are under such a contract. Citizen donations have amounted to only a few hundred dollars, but a large donation of $34,000 was made by a private citizen to purchase a new MICU for the program; the unit is in the process of being acquired.

The substantial yearly funding by the city has allowed the program to own all its equipment, with the exception of the few dedicated telephone lines. Most of the equipment was purchased in 1972, with the telemetry and additional drugs added in 1974. In FY 1975, the 23rd MICU was added, to bring the active force up to 17 units (with six in reserve); in 1976 money was appropriated by the city council to purchase a 24th unit, but through an administrative mix-up, the unit is now being purchased with the funds from the private donation. The council is currently being asked to fund an additional unit.

The EMS program has not had to face any cutbacks in its annual funding level and has enjoyed an overall increase in expenditures even though the department's resources had become constrained. There are two reasons why the EMS program would not likely suffer severe budgetary cutbacks and why in some ways it would be given preferential treatment. First, the program is functioning at the absolute minimum staffing level. The chief and other administrators have agreed that the

program could not function with fewer than two men and the present complement of equipment. Moreover, any reduction in the number of MICU units would be immediately noticeable to the community and a source of complaints.

A second reason for the preferential treatment of the EMS program is the double duty performed by its staff. In 1973, a new pension plan for the department reduced overall manpower by over 100 men; at the same time, another 46 men were taken off the rigs to staff the EMS program. Thus, because the paramedics are fire officers first and paramedics second, the department was able to economize in filling its paramedic positions. A group of 106 recruits was then hired to fill the vacancies left by the 146 firemen and the engines/trucks were restaffed with slightly fewer men. The paramedics now serve as a supplement to the fire companies as the need arises. Because of the dual role performed by the paramedics, any budget cutbacks would probably result in the release of some of the 106 new recruits rather than any of the EMS personnel.

Personnel and Training

There are approximately 318 firemen in the department who are trained either as EMTs or paramedics. All of the 170 paramedics and 34 of the EMTs are functionally assigned to the ambulance division and perform their job on a regular, full-time basis. The rest of the EMTs are within the operations division and are assigned as regular members of the engine or truck companies. Although all of the fire officers are covered by a civil service system, there is no special classification for the EMTs or paramedics. Instead, the officers receive their distinction by having state certification and are put on "special assignment" within the department. The department pays the paramedic/firemen on special assignment an additional $25 per month but provides no other type of special distinction. Other personnel who are involved full time with the innovation include a division secretary, three lieutenants (paramedics), one Captain (EMT), and four EMTs who rotate as radio operators at the hospital base station. There are also six dispatchers who send out the MICUs and a cadre of training personnel who are indirectly involved with the innovation.

Currently, the department has about 20 volunteers a month who wish to transfer into the ambulance division—just enough to balance the number of officers leaving the division. The volunteer has to be in the department for at least one year before being selected. There is no entry examination, only a subjective evaluation by the chief of operations and the chief of the ambulance division. Once selected, the men are sent through an intensive training course conducted outside the department. At the end of the class, they are given an exam by the state department of public health to be certified as either EMTs or paramedics. The certification is good for two years, and at the end of that time the fire officer must take a five-day refresher course for EMTs or a ten-day refresher course for paramedics, and another exam. All exams for the EMT and paramedic rating were created prior to the first training programs for the Dallas firemen and are also used for personnel trained from elsewhere thoughout the state.

The initial training program for EMTs was the product of an advisory subcommittee (to the city council ambulance committee) appointed by the Mayor in 1972. The subcommittee advised the chief of the ambulance division for the training program. The content of the program was based on the U.S. department of Trans-

portation's recommendations, although some modifications were made to include suggestions from other EMS programs. The committee also served as liaison to the various hospitals participating in the training program. By the end of 1972, the subcommittee's role was delegated to an associate professor at the medical school. Thus, when the paramedic program was started, its training program was designed almost exclusively by the associate professor, the chief of the ambulance division, and an ad hoc training committee. Members of the committee include a surgeon, a cardiologist, a registered nurse assigned to the EMS program full time, a coordinator from the department of public health, a skills instructor, and the chief of the ambulance division.

The training program for both EMTs and paramedics is conducted on a periodic basis by the University of Texas Southwestern Medical School. Until 1976, the school only trained Dallas fire officers and could handle only about five classes of 30 officers each year. The training was provided free of charge to the fire department, although there was never any formal contractual arrangement between the department and the medical school. There appear to be three major reasons for the medical school's contribution of training. First, the president of the Health Science Center (previously the dean of the medical school) is strongly supportive of the EMS program and feels that the school should be doing the training as part of its public service. Second, the doctors in the medical school also support the program and are willing to donate their time. Finally, the medical school receives a large amount of fire department equipment and additional staff support in the emergency room from the arrangement.

As the training program leveled off for the Dallas Fire Department in 1976, the training committee decided to begin training other fire officers from other jurisdictions in the metropolitan area. Currently, the committee will accept fire officers from other cities if the city has first shown a genuine commitment to the EMS program, i.e., committed funds to purchase the necessary equipment. The cities then pay a $300 tuition for each EMT trainee or $1,200 for each paramedic trainee, which is paid directly to the medical school. In all, there have been 12 training cycles since the EMS program began.

The medical school staff has provided considerable technical assistance to the program as have the two advisory committees that were initially established. However, once the program was started, there was little outside technical assistance from consultants. Two sources of assistance that were particularly helpful in the early stages were the management and communications services provided by the city. Initially, the city provided its own management services to help the department plan the EMS operation. These services are used infrequently now, having been replaced by the department's own management experience and in-house computer system. Similarly, the initial planning, installation, and debugging of the telemetry equipment was handled by the communications services of the city, but the department developed its own capacity to solve equipment problems and modify the equipment when necessary.

The EMS program has been marked by a relatively low level of turnover among personnel. Out of the over 330 personnel trained, only a handful have left the department. Others have requested transfers out of the ambulance division because of being "burned out by the pace," but they have remained available for duty on the regular engines and trucks. There has been no turnover among supervisory

lieutenants; the captain who supervised these lieutenants (and served as an assistant to the division chief) was replaced by a batallion chief in 1976. Most important, however, is the absence of any turnover at the division chief level; the same person who designed and initiated the program is still in command. Several respondents stated that if the division chief were to leave suddenly, the program would be in serious trouble because much of the EMS information and procedures have not been formally written. Because of the relative isolation of the program, the recent turnover of other top level administators (including the department chief) has had little effect on the EMS program.

Organizational Governance

Because the innovation was a new function added to existing department operations, there was little revision needed in specific forms already in use. The innovation has, however, generated a large number of new forms to be filled out by EMTs and paramedics. Some of the forms have already gone through one or two revisions as procedures have been updated and refined. In addition, as with the establishment of the new, separate ambulance division (which is a formal unit on the department's organization chart), new procedures and regulations to be followed by the EMTs and paramedics were issued as "orders" from the division chief's office; thus, some formalized and official procedures do exist for the innovation.

The innovation is mandated by a single city council ordinance which took effect in November 1972 at the expiration of the city's contract for private ambulance services. The ordinance has been mainly drafted by the chief of the ambulance division, with the assistance of the city's legal affairs office. There are also several state statutes that affect the operation of the innovation but which do not serve as mandates. For example, the state law requires that all EMTs and paramedics must be certified by the state health department. The health department in turn has a set of regulations governing the requirements for certification. Other state regulations govern the safety features of the equipment involved but, again, only indirectly affect the innovation.

The innovation has not been a part of any collective bargaining with the unions. State law prohibits any binding arbitration, and so the unions are relatively weak and inactive. The International Firefighters Association (IFFA) to which the fire officers belong has, however, been involved with the innovation and has lobbied the city council for certain changes. In particular, the IFFA sought better pay for the paramedics on the basis of their increased workload, but the move was unsuccessful. It has only been with the recent change in department administration that the paramedics have had any kind of organization, and the new chief has tried to deal with many of the longstanding grievances, e.g., pay and recognition, of the men.

Another addition to the department as a result of the innovation has been a set of purchasing specifications and maintenance procedures. When the EMS program was initiated, all of the equipment (MICUs and telemetry) had to be purchased. The chief of the ambulance division wrote the specifications for the equipment, and he has written the revised specifications for the 14 chassis that have since worn out and been replaced. The purchase of medical and communication equipment has followed the traditional department procedures, using the specifications generally provided by the manufacturer. The most extensive modification required by the

innovation, other than making space in the fire stations to park the MICU, has been to find closet space at each station to keep the medical supplies.

To handle the increased demand on vehicle maintenance, the department hired two more mechanics and one body/fender specialist to work full-time on MICUs. Arrangements were made between the ambulance division and the maintenance shop to hire the additional staff and to budget the replacement costs for the equipment annually. The EMS program had only to bear the initial cost of the equipment, the other years being built into the depreciation budget. Maintenance on the radio equipment and the amb-paks is handled in a similar manner by the division of equipment services: EMS buys the initial equipment, but it is maintained and replaced by the maintenance section. Thus, the necessary maintenance and replacement procedures have been built into the regular operations of the fire department.

There have been a few design changes on some of the equipment to account for needed improvements. For example, the brakes on the MICUs were modified to hold up under heavy stop-and-go travel. Fifty-foot patch cords were added to the radios in order to transmit via telephone when radio transmission was not possible. In addition, the paramedics made modifications in the types or use of medical supplies to give better care. However, there have been no major modifications and no new models of equipment have been purchased.

D. REASONS FOR ROUTINIZATION STATUS

Service Applications and Outcomes

H_1 (core application): Although the EMS program replaced no functions within the fire department, it did replace the emergency ambulance service that had been provided to the public by private suppliers. The innovation met the two requirements imposed by public and professional concerns: it provided emergency medical care to the public with a shorter response time and it provided appropriate and satisfactory treatment in doing so. It did not totally replace the several private companies, however; such companies can continue to transport non-emergency cases as long as they comply with the new standards of operation.

H_2 (competition): There is only a single application for the innovation, even though the innovation is capable of accomplishing several tasks simultaneously. Therefore, there is no competition for either the manpower or resources of the EMS program from the other divisions in the department. If a shortage of manpower occurs at the location of a fire, the chief in charge at the fire scene can reassign the paramedics to a firefighting role (but this situation has not yet occurred). If tradeoffs are to be made within the EMS program, they are usually made by the chief of the ambulance division.

H_3 (service-related payoffs): The primary beneficiary of the innovation has clearly been the general public. They are now receiving faster, better quality emergency medical care. The incidence of fatal heart attacks and the complications from trauma have both decreased since the start of the program. Specific measures for the benefits of the program, however, are difficult to judge because of the nature of the service. The department claims only partial credit for the total decrease in fatal heart attacks and will only discuss benefits in terms of improved response time (from ten minutes down to six). department statistics only show that the number

of responses and the number of people served increase each year, and that the types of service calls have also expanded.

The secondary beneficiaries of the innovation are the hospitals and the fire department itself. The hospitals benefit from the improved care the patient receives at the scene of the accident and are able to better prepare for the patient's arrival at the emergency room. The EMS program, in essence, increases the success rate of the hospital by starting the care sooner. The fire department has benefited from the incresed public exposure; the image of the department has changed from one of "firemen sitting around all day playing checkers" to one of "firemen providing rescue and emergency care 24 hours a day." The change in the public image has meant a higher status among city services and perhaps an easier time during budget proceedings.

The innovation has not been without its problems, however. The fact that there is a special class of firemen called "paramedic" that performs a different function from the regular firefighter, but who is housed in the same station, has caused some conflict among the men in the department. On the one hand, the paramedics feel they are not appreciated, are underpaid, and are given excessive workloads. On the other hand, the regular fire officers feel the paramedics have a comparatively easy job in the MICUs. Hard feelings are exacerbated by the abuse that paramedics sometimes face in answering calls in certain parts of the city; occasionally, individuals will obstruct the fire officers in the performance of their duties. These internal problems have not affected the operation of the innovation but may have caused a decline in the number of men volunteering for special assignment.

External Environment

H_4 (crisis conditions): The use of the innovation began as the result of a chronic need for quick and competent emergency medical care. This need was recognized by both the city council and the local news media and reflected a widespread public dissatisfaction with the private ambulance service. The medical profession was also acutely aware of the problem and expressed its concern about the condition of the arriving emergency patients.

H_5, H_6 (client-community support): The clients of the innovation, i.e., the general public in Dallas, are not formally organized to support the innovation. Their support is expressed instead through the local media and through the city council. Several community groups have expressed an interest in the EMS operation and requested speakers to inform them of the program. At times, the public will make small monetary donations as well.

Outside of the local government, the strongest supporters of the innovator are the medical school, the local EMS committee, and other municipalities that contract with Dallas for service. The medical school provides support through the contribution of training programs and through the informal lobbying of the city council. The local EMS committee similarly works toward generating public support and making its opinions known to the city council. Finally, the other communities that contract with Dallas either for direct service or for the use of the telemetry equipment show support for the innovation through their service demand and through the status they confer on the city for operating such a program.

Although the EMS committee and the medical school are the most enthusiastic supporters of the innovation, the strength of the program comes from broad public

awareness. When the program was introduced and again when the paramedics were added, there was substantial press coverage of the innovation. The public affairs division organized a public relations campaign to make the community highly aware of the service and to inform residents on how to call for assistance. Since then, other articles have appeared periodically in the press and there has been limited television coverage. The program was given an additional boost at campaign time when several of the candidates for city council included an EMS plank in their platform. The division chief occasionally writes articles for national publications, describing the operation of the Dallas program.

The only opposition to the innovation occurred at the outset of the program. Private ambulance companies opposed the move because of the business they would lose and the new set of regulations. Several city council members were also opposed to the idea on the grounds that private enterprise should be allowed to provide service where possible, and that government should not interfere. The council members changed their opinions after examining the private service more thoroughly, and the private companies have not expressed any criticisms of the innovation for several years.

Internal Characteristics

H_7 (administrators): The change in top level administrators in 1976 represented an increase in the department's support for the EMS program. The previous chief and operations division head had not been exceptionally strong supporters, but they did implement the program and made the appropriate budget approvals and assignments of personnel (note that the program had been mandated by the city council). The planning and operation of the innovation were delegated to the chief of the ambulance division, who was allowed to pursue the program as long as it did not interfere with other regular department operations.

With the change in administration, the department has taken a somewhat new direction. The new administrators are much stronger in their support of the EMS program, even though their knowledge of the program's operation is still limited and they are willing to continue delegating responsibility for the program to the division chief. Many of the administrative roadblocks have been removed from the innovation's operation and many of the longstanding problems are being confronted. The chief has always and continues to support the EMS operation through annual budget appropriations.

H_8 (innovator): The chief of the ambulance division has clearly been the single innovator for the EMS program. He was originally assigned to the innovation from the planning and research section and given the job of planning and implementing the council's mandate. He worked mostly by himself within the department but drew on outside resources from the city offices, the medical school, and other EMS programs. The division chief is responsible for specifications for the MICU units, the final equipment arrangements with Motorola Corporation, the telemetry, and the Amb-paks. He has been instrumental in the design of the training curriculum and the drafting of the initial council ordinance. He is trained as a paramedic, knows the equipment inside out, fights for the funding annually, and has a never-ending supply of ideas on improving the EMS operation. As mentioned before, there is some concern that the division chief has been so instrumental that if he were to leave the division, the program might suffer.

H_9 (practitioners): There was no resistance to the innovation in the early stages of the program on the part of the fire officers; many were happy to volunteer and many still are quite enthusiastic about their work. However, attitudes have changed somewhat over the last two years, with the result that fewer men are volunteering for the division and those who are already inside show some disappointment. Almost all of the fire officers are committed to the EMS program and would resist any move to drop the program, but they are dissatisfied with some of the working conditions and the limited recognition for their effort. The new administration is actively trying to resolve these problems and to encourage the next round of volunteers for the innovation (the planning for the innovation was based on a three-year tour for the paramedics because of the heavy workload).

Service as an EMT or paramedic does not contribute toward career advancement within the department. At times, it has been seen as a disadvantage because it reduces a fire officer's firefighting experience and takes away from the time available to study for promotional exams. Thus, because there is no promotional credit for EMS duties and because the experience necessary for passing promotional exams comes from firefighting and not emergency work, serving in EMS positions may actually have a negative effect in terms of career advancement. Similarly, the additional $25 a month in special assignment pay is not seen as a strong incentive because it does not compensate for the additional workload. The real incentive is internal to the paramedic or EMT—i.e., the satisfaction of helping people in emergency situations. The administration is currently trying to establish a career path that includes the ambulance division and to boost the special assignment pay.

H_{10} (adversary group): Some officers within the fire department were initially unenthusiastic about the innovaton because of the belief that emergency medical care was not a proper function of the department. Such feelings, however, ceased shortly after the program was mandated by the council. Private interests represented by the city council also initially opposed the change on grounds that private enterprise should be allowed to provide the service, but such opposition has also subsided. Currently, there are no groups in the department or the city government who strongly oppose the EMS program.

MIAMI POLICE DEPARTMENT
MIAMI, FLORIDA

Persons interviewed:

Assistant to the City Manager
Assistant to the Chief
Commander, Information Services Section
Supervisor, Computer Operations
Manager, Systems Development Group
Assistant Commander, Records Section
Public Information Officer
Officer, Patrol Section
Sergeant, Operations Analysis and Research

A. BACKGROUND

As of the fall of 1976, the Miami Police Department employed approximately 799 sworn and 382 non-sworn personnel to serve a central city of about 350,000 people. Since 1969, the department has been undertaking a massive program to modernize its facilities and to expand its capabilities. This program has been supported by a $20 million bond issue approved by city voters in 1970 and is expected to be concluded in 1978. The full-scale planning activities, however, did not start until April 1972, when the department contracted with Stanford Research Institute (SRI). For four years, SRI worked closely with department administrators, providing intensive technical assistance and preparing a master plan of several hundred pages.

In October 1976, the department moved into its newly constructed $11 million headquarters building and began to operate with about $3 million of new computer and communication hardware. Tentative plans exist for spending an additional $3 million on the computer and communications systems. The department's new computer system will support two innovative programs: Computer-Aided Dispatch (CAD) and Computer-Assisted Report Entry (CARE). CAD uses the computer to record information from incoming complaint calls and to route them to the appropriate dispatcher for immediate assignment. The system replaces an old, three-step, conveyor belt and status board dispatch system. CARE uses the computer to record the data from officers' reports (e.g., reported crime, suspect's characteristics, and stolen property) and to print out a wide range of statistical analyses. Mobile digital terminals, to be added in 1977, will allow the officers to query the record files directly.

B. THE INNOVATION

One of the most important resources for a police department is information about crimes and the department's own performance. The increasing sophistication of criminal techniques requires that data be kept on names, vehicles, methods of operation, etc. Administrative and planning activities further necessitate the analysis of data on officer performance, case status, and monthly crime statistics. Most

departments have responded to this demand by implementing automated or computer-assisted data systems.

Like most departments, the Miami Police Department traditionally tabulated by hand the statistics needed for the FBI's Uniform Crime Report (UCR). In the late 1960s, the department acquired its own IBM Tab reader/sorter to automate statistical reporting. Even before the bond issue planning in 1969, it was realized that the Tab machine was inadequate for the amount of analysis being requested, and therefore money for the department's first computer was approved in the 1969-70 budget, with the computer (NCR Century 100) being installed in early 1971.

The NCR Century was a small business computer limited in both its capacity and speed; all jobs had to be processed singly and only in batch mode. There was no on-line capability, and the operation required an intermediary programmer/operator to translate user language into computer language. Thus, the application and turnaround time of the computer depended on the number of personnel available to run it, as well as the capacity of the machine itself.

The approximately 350 programs[1] written for the computer were roughly equally divided for payroll, program development, and statistical purposes. The payroll section of the department was given a printout of personnel attendance and functions, which was forwarded to the city payroll office. The strategic planning section received all of its printouts on weekly and monthly crime statistics, status of arrests and warrants, response times, methods of operation, etc. The UCR data were sent to Tallahassee on magnetic tape and a printed copy returned for verification. The first section of the UCR data (Part I) was also printed out by area, sector of the city, and day of the week. Each shift sergeant was given a copy of the printout from his sector, showing criminal activity for the previous calendar week. Finally, the chief himself reviewed most of the printouts in order to closely monitor all of the department's activities.

The department leased the NCR computer until very recently, when the first new computer system purchased from the bond revenues (two PDP 11/45's) assumed all of the NCR functions plus many new ones. The Miami computer system has thus included two generations of equipment, with the most recent generation using several computers to accommodate both the array of older functions as well as the CAD and CARE applications.

C. STATUS OF ROUTINIZATION

Budget and Equipment

The funding support for the NCR computer and support staff was made a part of the department's budget in 1969-70. There were no federal or state funds involved in the data processing operation, although outside grants were utilized for special programs (e.g., investigations of organized crime) that relied on statistical analyses. Funds from the 1970 bond issue, which contained about $6 million for computer hardware and software, were not used until late 1974, when the department contracted for the two PDP 11/45's from the Digital Equipment Corporation. At about the same time, six new staff were hired to program the new computer and

[1] No packaged programs were leased or purchased from NCR when the computer was first introduced.

to facilitate the conversion of programs from the NCR to the PDP system. These six positions are funded from the bond revenues for development work. It is anticipated that the bond revenues will end by 1978, at which time the hardware (including two PDP 11/70's now being installed) and software will be transferred back to general funding. Thus, funding for the system will have been entirely from local funds (i.e., hard money) but from different local budget categories.

The NCR system was maintained over six budget cycles, with apparently little change in its annual level of funding. There has been no project-by-project accounting, as all data processing was charged to a single account. Because the computer was leased and maintenance was included as part of the agreement, operating expenses were limited to about $2,200 per month. With the acquisition of the new computers, staff costs have been the single greatest expense for data processing, with the annual expenditure approaching $400,000 for the past two years. In 1977, the department has had to face an across-the-board 4.5 percent budget cut. The cutback caused the abolishment of two vacant civilian positions in data processing: a programmer and a keypunch operator.

Personnel and Training

All the personnel directly involved with the computer are under the auspices of the city's civil service system, a fact that had created some problems in introducing new data processing specialties. At the time the NCR computer was acquired, the positions and job descriptions for the four to six coders and four to six keypunch operators had already been long established. When the PDP 11/45 computers were purchased, three new civil service classifications had to be created, as the existing "programmer" classification was far too limited. After several months delay,[8] the department was finally allowed to hire two senior systems analysts, two systems programmers, and two application programmers. A seventh staff member, to act as systems development manager, was also hired at that time. Unlike the other new positions that were funded from bond revenues, the manager was paid from the general fund.

For the support staff, the basic skills of reading, keypunching, and programming are now prerequisites built into the qualifying exam for each respective position. New personnel are selected from two to three people on a civil service list of those passing the qualifying examination. Similarly, the newer staff classifications—analysts and programmers—are also covered by a civil service qualifying examination and certain educational qualifications.

Organizational Governance

The use of the computer has been marked by three major changes in governance organization and rules. First, a reorganization of the Administrative Division has established the data processing system as a separate administrative entity. Second, the department has modified the incident reporting forms to reduce the duplication of data and paperwork. In the 1960s, a single report form was success-

[8] The new positions had been presented to the civil service board by the chief of police. The board, however, acted only after an extended period of time marked by numerous discussions between civil service personnel, the city manager, and the police chief.

fully substituted for several shorter ones. A more recent change has resulted in a single form for filing all reports. The new form is formatted for easy entry directly into the CARE system, and a manual has been written specifically to help officers complete this form. Third, the department has entered into a formal agreement with the State of Florida to submit its monthly UCR data on magnetic tape rather than written forms. Thus, the computer system is reinforced by the requirement for collecting UCR data and by the agreement to submit the data via tape.

D. REASONS FOR ROUTINIZATION STATUS

Service Applications and Outcomes

H_1 (core application): Even a limited capacity computer such as the NCR supported a variety of applications. In Miami, these applications replaced manual systems and thus were part of the core information-gathering and analysis functions of the department. For instance, data were needed for the UCR report and for tracking department performance (e.g., status of arrests, response time, and deployment). Even though the printout was often seven to nine days old when first available, it nevertheless enabled both the chief and the unit sergeant to monitor criminal activity in a particular sector. Equally important was the collection of facts and characteristics on suspects, crimes, property, etc. Officers and investigators could not rely solely on the specialized printouts because of the limitations of the data and computer, but the system was called upon four or five times each month to provide information. Finally, a portion of the computer's time was devoted to the simple function of payroll. Because the payroll was actually handled by the city finance department, the police department's responsibility was only for maintaining the complex attendance records.

H_2 (competition): With the expanded computer system, these applications will be enhanced by two other core functions, dispatching and case entry. Thus, the computer system has continued to grow and to provide important services to the department. Initially, the payroll function was considered of second priority to the other statistical functions, but conflicts did arise regarding the actual time to be allocated to each. With the exception of the monthly UCR report, investigations and other projects usually followed a flexible schedule. As there were no formal priorities established for the computer time, jobs would be processed on a first-come, first-served basis (and according to the preferences of the head of data processing). Payroll, however, soon "created its own priority" because everyone wanted to be paid on time. When competition arose for computer time, the conflict had to be settled by the manager of systems development, or it proceeded up the hierarchy for resolution. With the new PDP computers, such conflicts will no longer exist as there is ample capacity for all of the older functions as well as the new ones.

H_3 (service-related payoffs): To date, the actual payoffs from the computer system have been minimal if measured in terms of changes in productivity; but it must be remembered that expanded computer operations only began in October 1976. Very few of the officers know anything about the computer, its uses, or the staff running it, and no critical cases are known to have been solved simply because of computer assistance. Those people involved in planning police deployment have experienced some benefit from the data, e.g., helping to balance sector manpower

but again the payoff is not clearly identifiable. (These kinds of payoffs may become more evident with the new system.) The single, most useful feature of the NCR system, however, perhaps has been that it has symbolized the department's modernization program.

External Environment

H_4 (crisis conditions): The operation of the computer system did not follow any specific crisis conditions. The adoption of automated data processing was more the result of a slowly emerging problem—the rising incidence of crimes that had to be tabulated and reported.

H_5, H_6 (client-community support): By far the strongest supporter of the computer system outside the department is the general public. The wide margin by which the 1970 bond issue passed affirmed the public demand for better police services. The new computer and communications hardware were clearly proposed as part of the bond issue, and a picture of the NCR computer was included in the referendum literature, even though the NCR had not actually been installed. The emphasis on new equipment such as computers appears to have captured voter attention, primarily because the shock of the 1967-69 demonstrations, riots, and other disorders were still vividly remembered.

The continuing problem of crime in the streets reinforces the use of the computer in two other ways. First, the greater frequency and sophistication of criminal activity requires increased monitoring. Organized crime, for example, is perceived as a long-term phenomenon, and both the public and public officials place great faith in the computer as being instrumental in actions against organized crime. Second, the exchange of information among law enforcement agencies is handled by computer, either directly or indirectly. The state's acceptance of UCR reports on magnetic tape is one example. The department's query of national criminal justice data banks via remote terminals is another.

Internal Characteristics

H_7, H_8 (administrators and innovator): The greatest internal support for the system comes from the department's top administrators. The police chief who was responsible for the entire program and for bringing the department "into the 20th century" was a highly controversial figure recruited from outside the department in 1969. Although he understood very little about computers and their technical potential in police work, the chief was convinced that they were an essential part of the future of the department. He took the responsibility for organizing and coordinating the task forces and steering committees that handled the bond issue and supervised the entire planning program.

The chief's efforts survived his departure in October 1974 and the appointment of a new chief from within the department. The new chief had been the assistant chief for operations and had been actively involved in the planning of the new computer system. It is felt that he has become an even stronger proponent of the system than his predecessor, a view that is partially confirmed by the fact that he personally reviews most of the printouts. Other top administrators who were involved in the computer planning are equally committed, either because they be-

lieve in its benefit for police work or because they feel that the dollar expenditure thus far is so great that there is no choice but to continue the program.

One particularly strong supporter within the municipal administration is the assistant to the city manager. He was closely associated with the previous chief, was instrumental in the computer's early design and planning, and has been responsible for guiding the data system through its budget and implementation cycles. Yet, he is not involved in the daily operation of the computer or in the technical aspects of the new system. There has been no turnover in his position since the computer system was initiated, and so his own role has been a major factor in the incorporation of the system.

H_9 (practitioners): As mentioned earlier, practitioner support for the computer system is mainly limited to those few persons who actually use its output. Most officers have only seen the Part I UCR printout for their own sector. However, even this brief exposure has built up some support among the officers, whose primary interest is "what it can do for me on the street." The officers appreciate feedback on how they are peforming, especially relative to other sectors. They also want data on the types and location of criminal activity so they can be more aware of what to observe while on patrol. More importantly, they want other kinds of data available to them on the street and have been disappointed when the data have not been accsible in the past. With the new applications effective in 1977 (CARE and CAD), and the remote/mobile terminals, all officers will be linked directly to the computer system and will be able to make their own requests. This kind of direct participation will no doubt foster strong practitioner support for the system.

H_{10} (adversary group): There has been no opposition to the innovation by individuals within or outside of the department.

OAKLAND UNIFIED SCHOOL DISTRICT
OAKLAND, CALIFORNIA

Persons interviewed:

Acting Director of Data Processing
Mathematics teacher
Staff person in Testing and Evaluation

A. BACKGROUND

The Oakland Unified School District was the site of a field visit on Computer Assisted Instruction (CAI). Approximately 53,000 students are enrolled in Oakland's six senior high schools, 16 junior high schools and 64 elementary schools. Another 14,000 students attend special classes for adult or handicapped students, bringing the overall district enrollment to approximately 64,000 students. The district has a large minority population: two-thirds of the students are black and 15 percent are Spanish-surnamed, Asian, Native American, or Filipino. The enrollment level has increased slightly over the past five years.

District expeditures for 1975-76 totalled $136,472,969. Although local and state money provided the largest proportions of these revenues, the expenditures included a federal contribution of over $16 million. The district's large minority population qualifies it to receive most of these federal funds, with 60 percent of the schools eligible for outside assistance. However, even with the slight increases in enrollment and the availability of federal aid, Oakland's school district operates under severe budgetary stress. Respondents attributed this to the recent increases in employee salaries and fringe benefits. In addition, they reported that it is becoming more and more difficult for the district to raise local revenues, and therefore the budgetary strains are likely to continue.

B. THE INNOVATION

The data processing department has a district-owned Honeywell 6025 computer, which is used for instructional applications but which is primarily dedicated to such administrative functions as budgeting, payroll, and class scheduling. The department operates on an annual budget of about $700,000. About $300,000 of the budget is applied to salaries, with the remainder for equipment and supplies. Oakland schools, however, used computers for instructional purposes before the arrival of the Honeywell 6025. In the early 1960s, six of the district's high schools purchased programmable calculators, which they used in conjunction with the teaching of programming in various advanced mathematics classes. This type of computer programming continues to be part of the curriculum in some high schools. In addition, several of the district's schools experimented with the form of CAI that enables students to receive individually paced instruction in a variety of school subjects. This type of CAI was typically associated with experimental programs supported by outside funds and is currently not in use in the district.

C. STATUS OF ROUTINIZATION

Budget and Equipment

A general-purpose fund provides all the money currently used in connection with CAI. All charges for central processing unit (CPU) time are absorbed by the data processing group, which does not charge separate departments for the service it renders. The $75 per month payment for each of the 13 teletype terminals rented from the telephone company and distributed among the six high schools is paid for through a special budget category that has been part of the standard school allocations since the days when they had the calculators. The terminals do not appear as separate line items but are part of a general equipment category that includes typewriters and other standard office machines. Such equipment is considered essential to the daily operation of the schools, and this funding arrangement therefore makes it highly unlikely that the terminals will be singled out and eliminated from the budget.

Although the Oakland schools have used a computer for administrative applications for over 15 years, the third-generation Honeywell 6025 purchased in 1971 was the district's first computer that could be used for instructional as well as administrative purposes. There were, however, some instructional uses of the computer under way prior to the purchase of the Honeywell 6025, mainly the use of the programmable calculators by the six high schools in the early 1960s. In addition, three elementary schools in 1969 used money from a state grant for the improvement of mathematics education to lease a total of 15 teletype terminals and associated drill-and-practice oriented software from IBM. The terminals were linked via telephone lines to an IBM central computer in San Francisco, and IBM provided in-service training and equipment mantenance in connection with the project. However, the project was only in operation for six months and was plagued by equipment breakdowns. Many of the teachers involved said they would be unwilling to support future proposals for introducing CAI in the schools.

In terms of the in-house capacity for CAI, the data processing staff in part selected the Honeywell 6025 to replace their second generation IBM 1401 because it could accommodate a variety of instructional applications. Honeywell offered a software package in mathematics, reading, and other subjects, and the data processing staff initially leased some of these programs.

Despite early hopes that the purchase of the new computer would encourage the introduction of more classroom use of CAI, the presence of the Honeywell 6025 resulted in only minimal expansion in the use of the computer for instructional purposes.

When the Honeywell 6025 was purchased, the six high schools that taught programming gave up their programmable calculators and became part of the central system. Funds previously used for the maintenance of the calculators were used to lease 13 teletype terminals from the telephone company, which assumed responsibility for maintenance of the terminals. These terminals have continued to be leased by the schools, and the same model terminals that were at the school sites in 1971 are still there today.

Otherwise, the Honeywell 6025 has only been used for CAI in a few sporadic cases. One junior high school used federal funds to lease a telephone company terminal and used the Honeywell software for a three to four week mini-course in

mathematics. The course was popular, and the school continued to maintain a terminal for several years. However, when the teacher who had offered the course left the district, computer use was discontinued. Three elementary schools also used compensatory education funds to lease terminals. Each used mathematics or reading software for two to three years, but in all cases the program was eventually abandoned. In one of these cases, the teacher who had backed the program left the district; in the other two, the school was closed down.

Personnel and Training

The only personnel who are currently involved in CAI are a few teachers from the six schools where there are now terminals for teaching computer programming. Such involvement with the computer is completely voluntary, and respondents noted that in several cases the terminals would not continue to be used if the teacher who currently uses the computer were to leave. Most of these teachers have learned computer programming in college courses, although a few teachers acquired their programming skills in in-service courses that were once offered by the data processing department.

Organizational Governance

There is not now, nor has there ever been, any official central coordination of staff positions dedicated to CAI. The current acting director of data processing has informally supported such positions, however. When the new computer was purchased, he attempted to set up a users' group that met on a few occasions to share ideas and experiences. He also offered classes in programming, arranged for teachers to receive in-service credit for these classes, and had funds allocated from the data processing budget to cover the cost of the classes. About 40 teachers took advantage of the offerings that continued for a two-year period. Lack of interest on the part of central instructional personnel and administration officials proved discouraging, however, and data processing has discontinued most of these efforts.

There appear to be no laws or regulations that directly bear on the use of CAI. It was mentioned, however, that the procedures governing the distribution of special project funds have created certain problems with respect to the purchase of computer terminals for the schools. The special project money, which is the main source of school funds that can be applied to CAI, can only be allocated on a yearly basis, with no assurance that the individual school will receive special funding the next year. This creates a situation where schools are unable to commit themselves to a lease-purchase agreement, and equipment must be bought outright or not used at all.

D. REASONS FOR ROUTINIZATION STATUS

Service Applications and Outcomes

H_1 (core application): As was noted previously, the primary applications of the computer are administrative in nature. There is little question that the payroll, budgeting, scheduling, report cards, and other administrative functions are firmly implanted as part of the core operations of the district.

In contrast, the main instructional application of the computer is related to the teaching of programming in a few mathematics courses. Individual teachers decide whether they want their students to be exposed to the computer, with only a few teachers having moved in this direction. At most schools, whether or not the computer is used in the classroom depends on the disposition of a single teacher; if that teacher were to leave, the instructional application would disappear. This situation, coupled with the fact that efforts to use CAI in a drill-and-practice form have proved short-lived, clearly indicates that the instructional uses of computers have not been integrated as part of the core of the academic program.

H_2 (competition): There has been no competition among the administrative and CAI functions in Oakland. Although administrative applications are of prime importance, the data processing staff has been committed to encouraging the development of CAI. Part of the rationale for purchasing the Honeywell 6025 was its adaptability in both administrative and instructional areas. The computer is currently not being used to capacity, and the data processing staff would still be willing to support instructional applications if district administrators expressed any interest in having them take on that responsibility.

H_3 (service-related payoffs): Respondents did not cite any service-related payoffs that derived from CAI. Moreover, they described an unfortunate development related to an administrative application, which they felt had a detrimental effect on the overall image of the data processing group and led to district-wide discontent with all data processing services.

Shortly after the purchase of the new computer, the department agreed to serve as a trial site for a computerized payroll package that had been developed by the State of California. In exchange for the trial, the state agreed to provide the district with technical assistance and with free software. However, the district's efforts to implement the program proved disastrous. There were serious flaws in the software, and the state failed to provide adequate assistance in working through the problems. Paychecks were often late or made out for the incorrect amount.

As a result of this "trial," data processing developed a reputation for incompetence that led to the rapid resignation of two directors. District personnel were constantly critical of the data processing staff, and the operation became the scapegoat for many problems for which it was not at fault. Although the payroll system operates smoothly today, the respondents reported that some district personnel still have serious qualms about the data processing operation, and these feelings may alter perceptions of the usefulness of CAI.

External Environment

H_4 (crisis conditions): The computer operation did not emerge because of a crisis but was originally purchased for various administrative operations within the district. Similarly, the purchase of the programmable calculators, which were the forerunners of the current operations, was not associated with a crisis situation in the district. Rather, it appears that these were acquired at a time when budgets were not as tight as they are now and when school personnel felt that such expenditures were a worthy use of available funds.

H_5, H_6 (client-community support): Because so few students use the computer, there is little opportunity for wide-scale client support. The three terminals at the

school we visited were in constant use, and the school boasts an active 35-member computer club, but we were told that students at other schools do not necessarily have the opportunity to use the computer on such a regular basis.

For the most part, the community is unaware of the computer and therefore would not be active supporters of CAI. There has been at least one exception to this situation. In a junior high school, several parents became so interested in their children's CAI work that they arranged to visit during evening hours to work with the programs. About ten parents came to classes on a regular basis. However, the support by parents was not great enough to sustain the use of the computer after the teacher who had used CAI in that school left the district.

Internal Characteristics

H_7 (administrators): There appears to be no support for CAI by school administrators, and the respondents reported that the administrators have resisted all efforts to obtain their backing. In part, this may be due to the fact that Oakland did not have central curriculum specialists when the new computer was purchased. Thus Oakland, unlike other school districts that now have well-established CAI programs sanctioned or actively supported by the instructional personnel, has never had the benefit of having a mathematics coordinator who was enthusiastic about the computer and who was willing to work closely with data processing to develop a constituency favoring CAI.

H_8 (innovator): If any individual were to be singled out as an innovator with respect to the district-wide instructional applications, it would be the current acting director of data processing. He assumed the greatest responsibility in developing data processing's abilities to handle CAI and has attempted to provide support services, such as teacher in-service training, which would help establish CAI in the district.

However, his official responsibilities are to oversee the entire computer operation, which is viewed as a support service for the administrative rather than the instructional functions of the district. This places him in an unlikely position to be an effective innovator for an instructional innovation. He could possibly be more effective if there were strong administrative or practitioner backing for the innovation, but this is not the case in Oakland.

H_9 (practitioners): There also appears to be very little support for CAI among teachers, although there are clearly a few who feel the computer makes a contribution to their students' education and who sustain the limited current CAI applications. These teachers are often willing to have a noisy teletype terminal in the back of their classrooms, and they typically put in extra hours so all students who wish to use the terminals have an opportunity to do so. These teachers have no incentives for being involved with the computer other than the personal satisfaction they derive from exposing students to the computer, which they view as an important and effective instructional tool. Teachers with this level of commitment to the computer operation are rare, however, and it has often been the case that when a teacher who has worked actively with the students on the computer leaves a school, there is no other teacher available who is willing to assume the computer activities.

H_{10} (adversary group): Respondents noted that many teachers feel insecure about having the computer "take over" their jobs, and they therefore resist efforts

to introduce CAI in the classroom. There was some speculation that this resistance stemmed from a general lack of awareness about what the computer can and cannot do and that such doubts could be alleviated by the appropriate in-service activities. However, there appears to be little chance that such activities will be offered in Oakland, and teacher resistance to the computer is therefore likely to continue.

PORTLAND SCHOOL DISTRICT
PORTLAND, OREGON

Persons interviewed:

Supervisor, Television Services
Television Services staff, production responsibilities
Television Services staff, curriculum responsibilities
Television Services engineer
Two former ITV operation supervisors
Director of Educational Media
Portland teacher; former ITV teacher

A. BACKGROUND

Portland is the nation's 26th largest school district with 34 primary, 6 intermediate, 53 elementary, 14 secondary, and 30 special and alternative schools. There are approximately 62,000 students enrolled in the Portland schools, and the annual budget for the district is slightly over $100 million. Local property taxes account for 68.8 percent of these funds, and funds from the State of Oregon account for another 24.8 percent of the general fund. In addition, the district receives several million dollars in federal, state, and private funds for special programs outside the general fund budget.

In 1970, the school district decentralized into three administrative areas, a change that was to have a profound impact on the closed circuit television (CCTV) operation. As a result of the decentralization, each of the three areas was made responsible for the development and administration of its own instructional program, within established district-wide guidelines. Each area has had its own superintendent and has been advised by a separate citizen's committee responsible for counseling the area administration on such matters as educational programs, building needs, school operation, and other area problems. The central administration is headed by the superintendent of schools and provides coordination of the district's needs and services, public information, and leadership in the evaluation and overall direction of the educational programs.

Like other urban school districts, Portland has been confronted with declining enrollments during the 1970s. Since 1970, enrollment has dropped by nearly 13,000 students, thus creating the potential for substantial decreases in district funding. Funding problems have been averted because of increases in the local school tax rate, coupled with increases in property values. In addition, there has been a near doubling since 1970 in the amount of state and federal money available to the district. Thus, instead of budgetary famine, there has been a steady increase in the funds available.

Portland has also met another challenge common to urban districts—the need to achieve racial balance—with less public disruption than other cities. The district has used a twofold strategy to implement school desegregation. First, Portland established a policy supporting voluntary "administrative transfers," which enabled students from schools with racial imbalances to volunteer to transfer to cooperating suburban schools or to other schools in the Portland School District in order to achieve a more desirable racial mix. In addition, the district has adopted

a "magnet" schools approach with such special emphasis as "performing arts and technical education" in an effort to attract more white students to schools that previously had a predominantly black student body.

B. THE INNOVATION

The closed circuit television operation (CCTV) in the Portland School district has gone through several distinct stages since it was first conceived in 1967. Although these transitions have been largely influenced by external events, the sweeping changes evidenced in the philosophical and day-to-day direction of the operation itself have also reflected the outlook of the three supervisors who have successively directed the CCTV operation.

The initial impetus for the program (1967-69) was tied to the availability of funds for a model school operation. The district was awarded a three-year grant of state and federal funds to be used for improving the education of disadvantaged students. The district was to use part of the funds to establish a cable television operation that would produce instructional programs and distribute them to students in nine elementary schools, and a project staff having a supervisor, four teachers, and six technical personnel was assigned to the project. The major portion of the first year of the grant was spent in planning and producing programs, and in April 1969 the first programs were transmitted.

The basic approach was to produce programs that would be compatible with the regular class material and to enrich the classroom experience by introducing what were then popular approaches to instruction (e.g., discovery learning and indirect questioning). District-level curriculum specialists chose social studies, science, and art as the three subjects for instructional television (ITV) activities. Each week, two 15-minute programs for grades three, four, and five were produced in each of these subjects, with each program being transmitted over the cable at two or three different times. The programs were designed to correspond with the topics that students would normally be studying in their classes, and teachers in the model schools were required to have their students view these programs as part of their regular instructional program. To facilitate use of the system, half-day in-service training sessions were offered for teachers once or twice a year.[1]

The administrative decentralization that began in 1970 had a profound effect on this CCTV operation. As part of the decentralization, the CCTV supervisor was assigned to a deputy superintendent position in one of the three new administrative areas while retaining his responsibilities as director of the CCTV operation. Because of the intensity of the demands of the new job, he could devote little time to CCTV, and this essentially left the operation without a leader. In addition, the decentralization distributed the nine model schools among different area administrations, each of which had autonomy with respect to instructional decisions. This made it impossible to continue the program of mandatory viewing that had previously characterized the CCTV efforts.

After the CCTV operation had stagnated for about a year and a half, the central administration decided to appoint a new director and to place the operation under the aegis of a central service, the Educational Media Department. The new coor-

[1] Not all respondents agreed on the level and nature of in-service training during the early years. We have presented the view agreed upon by the majority of the respondents.

dinator was responsible for converting the operation into a program that would serve the entire district, and was given considerable freedom in shaping the CCTV operation. The major portion of the funding still came from state funds for disadvantaged students, but a small amount of money was added from the educational media budget (i.e., general fund) to justify television use by students who were not considered disadvantaged.

The emphasis of the CCTV operation shifted considerably during this second stage. Although there was still some effort made to produce programs relevant to traditional classroom subjects, all efforts at central coordination were abandoned. There were no mandatory viewing requirements, and decisions regarding the kinds of programs that should be produced were most frequently made on the basis of teachers' requests. Rather than producing a series of programs on a limited number of subjects, the CCTV operation produced a few programs on each of a wider range of subjects. Moreover, the focus of the in-service training shifted to emphasize the production aspects of television, and teachers were invited to sessions where they would receive instruction in creating their own programs for classroom use. The CCTV operation continued in this manner for a little over two years (1972-74), when the supervisor resigned. A new supervisor was immediately hired to replace the outgoing one and the CCTV operation entered into its third phase (1974 to present).

The CCTV operation in the Portland schools today bears little resemblance to its earlier counterparts. The new supervisor has rejected the "down the line" transmission in which a single program is sent to many classrooms at the same time, and instead has embraced a grass roots approach in which teachers are encouraged to adapt television to their individual classroom. Thus, when the five-year lease with the telephone company for cable services expired shortly after the new supervisor's arrival, he decided not to renew that contract and instead applied the $11,500 annual expenditure toward the purchase of video equipment (i.e., videotape recorders, monitors, and portable cameras) to be located in schools throughout the district.

This marked the beginning of a service-oriented operation that, unlike its predecessors that had produced and distributed programs to supplement classroom instruction, encourages the use of over-the-air television programs and teaches students and teachers to produce their own TV programs. The name of the operation has been changed from "instructional television" to "television services," and the group now engages in four major categories of activities, including: (1) recording over-the-air television programs and making them available for classroom playback, (2) providing in-service training to teachers in television production and in using TV as an instructional tool, (3) coordinating an equipment pool that distributes video production kits and other equipment to teachers in the district, and (4) teaching career-oriented television production courses to students in Jefferson High School, one of the district's magnet schools.

C. STATUS OF ROUTINIZATION

Budget and Equipment

During the first phase of the CCTV operation, the major support came from federal funds. During the second phase, the overall expenditures for the CCTV

operation were reduced somewhat, and the funding became part of a standing state disadvantaged fund that the state routinely distributes to school districts on the basis of the number of disadvantaged students enrolled in the schools. During the third and current phase of the CCTV operation in Portland, the amount of state disadvantaged money available to the program has remained about the same but the amount of district funds allocated to the television operation has increased to such a great extent that the majority of support now derives from district money. About one-third of the current television budget comes from the Jefferson High School budget. At this magnet high school, the television services operation has assumed responsibility for a career-oriented program of professional courses in television production. As part of the agreement regarding the Jefferson operation, the television services staff designed two television studios and moved their offices to the high school grounds. The studios and other equipment needed for the Jefferson program are used by television services as part of their district-wide operation.

This budgetary arrangement appears to have helped establish television services as an ongoing operation in the Portland schools. Having money available from three different sources gives the CCTV coordinator considerable flexibility in allocating equipment and personnel to different funds, and the television services supervisor has been careful to allocate some staff and some equipment expenditures to each of the funds. Thus, cutbacks in any one of them are not likely to debilitate the overall operation. Moreover, the diversity in budgetary sources has enabled the television services operation to serve such special groups as disadvantaged and magnet school students as well as the general school district population. Because of the sensitive nature of cutting back the services available to these groups, any moves in that direction are likely to be very carefully considered before they are approved by the board of education and top district officials.

Television services has also recently begun to receive small outside grants to produce television programs for use throughout the state. Work is now under way for programs on local government and on handicapped children. If these programs are well received, they will likely bring favorable publicity to Portland's television operation and will further contribute to the operation being viewed as an asset to the district.

When considering the purchase and replacement of equipment in the context of a CCTV operation, it is important to remember that the audio-visual field is one where there have been continual and rapid advances in the capabilities of the available equipment. The range of equipment now available to a district that is planning to set up a CCTV operation presents a far greater opportunity for flexibility in the design and use of the corresponding instructional program than did the equipment that was available in 1968 when the CCTV operation began. One of the most striking advances has been in the area of videotape technology. Videotape equipment provides an opportunity for relatively simple production and playback of programs that can easily be mastered by students and teachers. With the videotape technology, cassette tapes of television programs can be made available to teachers who use a tape recorder-like machine connected to a video monitor to view the tapes at any time they find convenient. In addition, it is possible for a teacher to stop a tape in midstream to discuss various points or to rewind the tape to have the class view selected portions of the program a second or third time.

These advances in videotape essentially enabled the shift toward the individual classroom approach that currently characterizes the Portland CCTV operation.

Because the television services operation carries out a considerable variety of television-oriented activities adapted to the desires of the individual classroom teacher, it is necessary to examine two general categories of equipment: (1) the equipment available to the television services staff for program production and instruction in career-oriented production classes, and (2) the equipment available for use at the local level.

The central production capabilities of Portland's television services are substantially richer than those of the typical CCTV school district operation. Portland has both black and white and color production capabilities and boasts the largest educational TV studios in the Northwest. The television services operation also has a video van with relatively sophisticated remote production capabilities. There was a near complete replacement and updating of equipment in 1975, when television services officially assumed responsibility for instruction in television production at the magnet schools. Because the magnet school program is designed to offer career relevant experience to students, there is a justification for (and the funds appear to be available for) a continual expansion and updating of this equipment to keep pace with the state of the art.

The situation is less promising at the local level, where the availability of equipment for classroom use has not kept pace with the demands. When the operation originally began, each classroom in the nine model schools received a television set. After decentralization took place, these were redistributed so that each school in the district had at least two sets. However, because of the district's commitment to a videotape approach, additional equipment has been necessary for these sets to be used with videotape programs. Money derived primarily from the educational disadvantaged fund and the educational media fund has been used to purchase 18 Porta-Paks that contain portable equipment that lends itself to on-site production of television programs. These have been purchased on an ongoing basis with three to six portable cameras added every year. The older portable cameras are still in acceptable operating condition and have not been replaced.

The television services equipment is distributed through an equipment pool. The television services group receiyes requests for equipment and schedules its use, and generally delivers and picks up the equipment. The radio shop, another group that falls within the Educational Media Department, once had responsibility for the equipment pool and still occasionally delivers the equipment to the school site. There have only been three weeks in the last three years when all the equipment had not been checked out for classroom use. In addition to equipment deliveries and pickup, the radio shop is responsible for equipment repair. This has created some problems for television services because the radio staff is not always proficient in the upkeep of new model television equipment.

Despite the apparent interest in television services equipment, few local schools have purchased any television equipment with their own funds. The respondents expressed some frustration over this situation and claimed that it had, to some extent, limited the television services activities.

Personnel and Training

The size of the staff has fluctuated over the years, depending on the level of funding available for the operation. However, there has been some continuity in the production personnel, several of whom were hired during the first two years

of the operation. During the model schools period, the staff included several teachers—certified personnel who wrote the scripts for the programs and appeared in the productions. All of these teachers left the staff after the district was decentralized and most returned to regular classroom teaching. They were not replaced and since that time there have been few certified personnel (i.e., teachers) on the staff. Certified personnel are occasionally used as consultants, however, and there are funds set aside for this purpose.

One of the first activities of the current supervisor was the establishment of approved classifications for members of the technical staff. Before he arrived, the classifications had been informal in-house designations, and salary levels did not reflect the true activities of many of the staff. In order to obtain the official job classifications, it was necessary to write job descriptions and provide evidence of salary levels offered elsewhere for comparable positions.

At the local level, each school has a designated radio-television coordinator. The coordinator is a teacher who receives about $200 extra per year for assuming various responsibilities associated with the position. Decisions regarding who should be designated as the radio-television coordinator and what his or her responsibilities should be rest with the individual school principals, and it is frequently the case that the person appointed has little interest in television services. The television services supervisor now meets with the radio-television coordinators four times a year, but the coordinators do not appear to play a very active role in publicizing or assisting in the television services activities.

Organizational Governance

In 1975, the Portland Board of Education passed a resolution requiring that a program of instruction in television production be part of the Jefferson High School's curriculum. The passage of this resolution assures the television services group of at least a limited level of funding each year, and as a result, the operation is likely to continue actively operating in the district.

One other passage that was briefly mentioned earlier also relates to organizational governance. It occurred when the CCTV operation was placed under the aegis of the Educational Media Department. This move linked the interests of the television operation with those of a firmly established service department in the district. In addition, this integration of the television operation into the regular school bureaucracy helped to dispell the notion that the television operation was to be a short-lived special program in the district.

D. REASONS FOR ROUTINIZATION STATUS

Service Applications and Outcomes

H_1 (core application): Television production is a core program at Jefferson High School and the television service's assumption of responsibility for the development and day-to-day operation of this magnet school program has been important in assuring the continued existence of the television services group. The expenditure for new equipment for Jefferson's studios is itself such a sizable investment that it would be difficult to justify a substantial program cutback. Moreover, the Jefferson program is in line with the district administration's commitment to

career education and school desegregation, two other factors that would make cutbacks unlikely.

In contrast, the other school functions of the television services department are generally unrelated to core aspects of the local schools' instructional programs. The early efforts to make the CCTV program an ongoing part of the core elementary school curriculum by requiring teachers to have their students regularly view programs in science, social studies, and art proved unsuccessful in that they were discontinued after the first director resigned. The operations today stress the use of popular television as a supplementary aid to instruction, and all decisions regarding the use of television in the classroom are left to the discretion of the individual teacher. Thus, television may be used in some classrooms in connection with the teaching of basic subjects, but there is no available information that would suggest whether this is or is not the case.

H_3 (competition): There appears to be no competition among the major applications of the television services operation. Instead, the existence of each application appears to enhance the continued use of the others. For example, the arrangements for offering instruction in television production at Jefferson provide excellent facilities for producing programs for district-wide use. Likewise, the district benefits by having available students trained as working professionals to assist them in television-related classroom activities. This arrangement also benefits the Jefferson students, who gain career-related experience and expertise that they would find difficult to acquire if the classroom opportunities were not available to them. Moreover, the fact that the television services operation is a district-wide function justifies the presence of a larger professional staff at Jefferson. Jefferson students thereby have the opportunity to be exposed to and instructed by a wider range of television professionals than would be available if the magnet school activities did not coincide with those of the rest of the district.

H_3 (service-related payoffs): There have been no formal evaluations of the outcomes or effectiveness of the television services operation. Respondents did seem to feel, however, that the program was moving in a productive direction, indicated by informal feedback they had received from practitioners. In particular, respondents noted that teachers had reported that the popular television approach was especially effective in teaching English grammar and vocabulary to students who previously had been difficult to motivate. The continued demand for television equipment has also been interpreted as an indication that television makes a contribution to classroom instruction. In addition, the scope and sophistication of the Jefferson television operation was singled out as having a certain amount of prestige value for the district.

External Environment

H_4 (crisis conditions): The evolution of the CCTV system did not follow any specific crisis. The main impetus at the outset was the desire to improve educational opportunities for disadvantaged students and the availability of external funds to support the CCTV operation.

H_5, H_6 (client-community support): We did not have the opportunity to speak with any students who were either enrolled in the production courses or who had been exposed to the services supported by the television operation in their classes. Because district-wide classroom use of television is scattered and typically sporadic,

it is unlikely that students would form a strong support group. There might, however, be some support by students for continuing television activities in the few schools that produce their own news broadcasts on a regular basis. Pupils who are studying television production at Jefferson are the only clients who would currently be likely to have a strong objection to television services cutbacks and who might actively lobby for continued program operation.

Although a few community groups have used the production facilities at Jefferson for their own activities, the community at large is for the most part unaware of the television activities conducted in the district. However, those who are concerned with the education of the disadvantaged could be called upon for support of the television services activities associated with the disadvantaged if either the funding were cut or if the funding were targeted at another group of students.

Internal Characteristics

H_7 (administrators): The instructional television operation has only received modest support from agency administrators. This is shown by the fact that the administrators allowed the CCTV operation to stagnate for a year and a half after administrative decentralization before appointing a new CCTV supervisor. Respondents expressed the view that the operation might well have been phased out at that time had not an experienced television teacher, who was a friend of the superintendent and who had recently returned from Samoa where television is the predominant educational medium, convinced the superintendent that she could turn it into a worthwhile operation.

The current supervisor is of the opinion that there was also thought given to phasing out the program when he was interviewed for his position. However, the decisions of administrators to hire new supervisors in both cases would seem to indicate that they are not hostile to the program and are willing to allocate some district resources to it.

Despite the general lack of enthusiasm by top district administrators, respondents indicated that there are at least two members of the board of education who favor continued operation of television services. In addition, the director of educational media appears to firmly support the operation and noted that it strongly coincides with the district's commitment to career education.

H_8 (innovator): Throughout the history of CCTV in Portland, the most active innovator has always been the instructional television supervisor, the individual in charge of the instructional television operation. There has been little programmatic direction or supervision of the television operation from more senior individuals in the school bureaucracy, and the supervisor therefore has had near total autonomy in determining how the budget will be allocated, in hiring the staff, and in directing the overall television operation. As a result, the television operation has largely reflected the background and disposition of the individual supervisors, and one comes away with the sense that the turnover in the supervisor's slot has resulted in little continuity in the CCTV operation over the years.

Unlike his predecessors, the current television services supervisor appears to be developing his programs to assure that there will be a continuing demand for the type of television activities he favors. He came to the Portland School District with a strong background in television production after having spent several years as an instructor in television techniques at a local college. This background contrib-

uted to his enthusiasm for linking the existing district-level service with the Jefferson program. One of his first activities was to present the administration with a detailed proposal for linking the CCTV with Jefferson's programs. His expertise in studio design brought him administrative support for the merger, and his administrative prowess enabled him to formulate an ongoing role for his group in the new program. The association with the Jefferson program probably has been the single most important factor contributing to the secure positioning of the television services within the district.

With the Jefferson arrangement in operation, the supervisor is now directing a concerted effort at generating interest in television services' in-service training. The assumption underlying this approach is that teachers who are exposed to and appropriately instructed in the use of popular television and in production techniques will create a demand for increased television-related services that will justify an expansion of the television services' activities.

H_9 (practitioners): At present, there is no clearly established base of practitioner support for the television operation, although there are several indications that teachers who use the service find it to be of value in their classrooms. The demands for television equipment are great and typically exceed the amount of equipment now owned by television services. In addition, interest in the television in-service workshops for teachers has led television services to offer several workshops each month, and sometimes as many as one per week.

The limited availability of equipment for school activities appears to be a prime factor that inhibits the growth of practitioner support for the television services operation. Because the operation is a district-wide service, it is necessary to distribute equipment among all schools in the district. This creates a situation where there is little equipment available at any one school and thus there are, at most, only a few teachers at each school who can use the equipment on a regular basis. This creates a situation where individual practitioner support is likely to be scattered throughout the district and, as a result, will be quite diffuse. Moreover, competition for equipment among practitioners at the school sites is a potential source of frustration that could detract from practitioner support for the operation.

H_{10} (adversary group): There seems to be little opposition to the instructional use of television or to the teaching of television production in the Portland School district. There are some indications that relationships with the radio shop are strained, but the problems appear to have more to do with establishing procedures acceptable to both the radio shop and television services, and do not reflect organized opposition to television services activities.

SAN DIEGO CITY SCHOOLS
SAN DIEGO, CALIFORNIA

Persons interviewed:

Director, Data Systems Department
Senior Systems Analyst and ITSS Project Director
District Resource Teacher for Computer Science
Member, District Finance Department
Member, Guidance Services
Curriculum Specialist, Mathematics Department
Director, Planning and Research Department
Assistant Director, Planning and Research Department
Time Share Coordinator, La Jolla High School
Time Share Coordinator, Farnum Elementary School
Time Share Coordinator, Collier Junior High School
Time Share Coordinator, Henry High School
Time Share Coordinator and Principal, Taft Junior High School
La Jolla High School student

A. BACKGROUND

The San Diego School District (15 senior high, 19 junior high, and 123 elementrary schools) has been faced with a slightly declining student population over the last several years in spite of a stable city population and an expanding economic tax base. The decline in students has forced a direct reduction in the district's operating budget because schools receive most of their funding directly from the state on a per pupil basis. The same statute providing for the state funding also limits yearly increases due to inflation to 6 percent, further reducing the district's ability to handle anything but basic instructional programs. Currently, there are some 120,000 students in the school system.

A school bond issue in 1975 has helped to inject new resources into facilities and instructional equipment for most secondary schools. Thirty new schools have been built in the last two years to comply with new state earthquake standards, but few old schools have as yet been closed.

Individual schools in San Diego assume additional importance due to the extensive decentralization of the operating budget for the district. In 1973-74, under the guidance of a new superintendent, each school was designated a separate cost center whose budget was determined by the average student enrollment and whose allocations were determined by the principal rather than the central administration. Each school receives not only its per pupil share of state funds but also its per pupil share of special funding such as Title I and funds for the gifted. It is up to the school principal to decide if he wishes to involve the teaching staff in the budgeting of these funds, and most do actively seek input from the teachers. During the decentralization process, citizen advisory councils were also created to work with the principal of each school on matters of finances, curriculum, and personnel.

The central administration still continues to provide a core of services to schools, however. Audio-visual, accounting, program specialists, and counseling are all offered and funded through the central offices, as are evaluation and data

processing. The Data Systems Department (DSD) provides technical assistance for computer assisted instruction (CAI), the focus of the present case study. The department has been in existence since 1951 and has been continually upgrading its capability and programs to meet district demands. Currently, the DSD owns and operates an IBM 370 system. Most of the computer programs pertain to student records, accounting, demographic anaysis, budgeting, and other administrative tasks. However, there is no instructional use of the IBM 370 system because of its very limited ability to handle time sharing and because of the high demand for administrative applications.

B. THE INNOVATION

Although the district was not interested in using its central computer system for CAI, there were several informal attempts to use other systems. For example, a local computer company sponsored a Boy Scout training program in computer science and programming. In addition, several of the mathematics teachers in the district taught pilot programs in a few special areas of instruction in the early 1970s. Each summer, 15 students were enrolled in a class taught by one of the mathematics teachers. The instructor was paid from discretionary funds, while the classroom facilities and the computer time were provided free of charge by a local college. The program had strong support among mathematics teachers and showed some promising results, but the administration was not interested in funding the program during the regular school year.

A survey among the district's mathematics teachers showed there was a growing interest in acquiring a computer to be used in the classroom on a regular basis. When the district underwent decentralization, discretionary funds became available at each school. A few of the more interested teachers began to interest school principals in pooling resources to support their own instructional computer system, albeit on a very small scale.

By the end of the 1972-73 school year, a core of mathematics specialists had sold their idea to the director of the DSD, who was then willing to risk committing funds on behalf of the participating schools (who would reimburse the DSD later in the year) to acquire a CAI system (which is called "Instructional Time Share System" in San Diego). An assessment was made of whether to attempt to upgrade the existing IBM equipment to handle time sharing or whether to acquire a totally separate system. A committee of mathematics instructors and data processing personnel agreed that, based on costs and the difference in use, it would be better in the long run to purchase a separate minicomputer.

The committee members approached the principals of all the junior and senior high schools in May and June of 1973. The members explained their idea and asked for tentative commitments from the principals. In June 1973, with only 11 users signed up, bid specifications were sent out. In August, the school board approved the purchase of the computer, primarily because the project was to be financed by the schools themselves and did not require additional district funds. With board approval, the DSD acquired a Hewlett-Packard 2000 minicomputer in September 1973; it was installed in February 1974 and was to be paid through a four-year, lease-purchase agreement. The participating schools were linked to the computer via business telephone lines. The computer itself was installed in the same room with the IBM system, although it was totally separate; teletype terminals were

installed in each of eight schools, usually in the mathematics classrooms. As a part of the package for each school, the terminal came with access to a 1,300 program library and storage for 1,000 records.

The HP 2000 was thus physically maintained within the DSD, and the DSD was financially responsible for any shortfalls in funding. The administrative responsibility for instructional time sharing, however, rested with the mathematics teachers in each school. From 1972 until 1975, one of the curriculum specialists spent about 25 percent of his time working with principals and teachers on the time sharing system. He had assumed the responsibility of promoting the idea with other schools, training the teachers, coordinating the use of the terminals, and arranging for the funding of the account from individual school budgets. In 1975, DSD assigned a full-time system analyst to coordinate the system. The other curriculum specialists also remained actively involved.

As teachers' interest grew and the number of schools participating increased, the funding of the system became more stable. The increased demand for the system also necessitated the purchase of two more minicomputers and numerous terminals. In August 1975, the second HP 2000 was added by the DSD and a third was added a year later, both on four-year, lease-purchase arrangements. Currently, the CAI system (with all three computers treated as one system) is operating at almost 90 percent capacity, with 85 out of a possible 96 ports used. There are 61 terminals distributed among 8 elementary schools, 16 junior high schools and 15 high schools. In addition, some schools have purchased supplementary time sharing equipment, including 12 HP card readers, 2 printers for tabular material, and 1 plotter for graphic material.

There are several other district and non-district users linked to the CAI system as well. In 1975, the Planning and Research Department purchased a port for computing enrollment projections, and Evaluation Services purchased one for computing test trends. More recently, the Transportation Department used the computer to determine bus routes in the face of shifting residential location patterns. Outside the district, several other education agencies have purchased their own ports: Point Loma College, San Diego Community College, and the Adult Education Program of the County Department of Education. These non-district users must provide their own terminals but they are charged the same rates as the district users.

A school's use of the time sharing system is determined by the number and background of interested teachers, and the resulting applications differ greatly at each of the participating schools. The schools have access to a wide variety of computer programs, ranging from elementary to college levels and covering many of the disciplines. Teachers and students also write their own programs. The most structured use of the CAI system is the drill-and-practice application found in the mathematics or language centers, while the most frequent use appears to be enrichment programs available through media centers. In both instances, the programs provide supplementary rather than primary instruction.

Some of the schools also use CAI for other than classroom purposes. For example, one of the popular new programs is a Guidance Information System used in 25 of the secondary schools to help students select colleges. The program lists colleges and universities by such characteristics as location, SAT levels, occupations, and extracurricular activities. The advantage of the system is that it forces

the student to make decisions about colleges and it allows him to easily explore other interest areas. Another application of the CAI system is to record books checked out of the library.

C. STATUS OF ROUTINIZATION

Budget and Equipment

The DSD functions very much as a service bureau for other units in the district. The work performed for the central administration, e.g., accounting and record-keeping, is funded through a fixed item in the annual budget, while work for the instructional units must be handled on a contractual basis. If a school or department, for example, wanted the DSD to initiate a project, the school would prepare a proposal and the DSD would estimate the cost. If the school accepted the estimate, it would write a contract with the DSD and pay for the work from its own budget. The DSD would then assemble the necessary resources for the project and assign the necessary staff. The CAI system receives no central funding for non-personnel costs through the DSD.

Initially, each user was charged $2,000 per year for the use of the computer and the terminal (each user had the same equipment and therefore was charged the same amount), and the funds were placed in the same account as the IBM 370 system. However, the commingling of funds caused great accounting difficulty in relation to special-purpose funds received from the federal government. To solve the difficulty, the DSD requested the budget office in 1976 to establish a special account to handle only CAI revenues and payments. The separate account has line items for supplies, contractual services, equipment, and special programs.

The fact that CAI was started in February 1974 with only 11 of 32 participating schools meant that the system would potentialy incur a loss for its first year (which the DSD would have had to cover). However, the purchase of several more ports by new users in 1975 adequately covered the first-year costs, and new subscribers each year have been added. Currently, the CAI account needs to sell the remaining ports on the third HP 2000 to cover the costs for the 1978-79 school year and to complete the last of the four-year purchase agreements. The DSD anticipates that the costs for the CAI system in 1977-78 will be approximately $90,000.

Each school or user is no longer charged the same flat fee, thereby making the accounting system somewhat more complex. In 1975, when a full-time coordinator was assigned to CAI and schools started using different types of terminal equipment, it was decided to charge each user according to the real costs incurred. The management committee for CAI (one elementary, one junior high, and one senior high principal, a director in the secondary division, the CAI coordinator, the data systems director, and the mathematics curriculum specialist) now divides the total costs (including an estimate for repairs and maintenance) for the year by the number of users and adjusts for the particular equipment used. Users are not charged, however, for the salary of the CAI coordinator, who is a full-time staff member of the DSD.

The decentralized budgeting system allows principals to pay for CAI from any of the funds allocated to the school. There are, however, two restrictions affecting the principal's decision. First, state accounting procedures require that lease-pur-

chase agreements be treated as capital expenditures; therefore, the funds have to come from capital outlay accounts. Second, the use of special funds, e.g., for the gifted, restricts the use of the equipment to only those eligible children; therefore, funds are frequently taken from more than just one special account to support the use of CAI. Non-school users also make their own decision as to the source of funding for CAI. For example, the Guidance Department spent $6,000 to purchase its software package but it does not pay for computer services because it does not have a port line exclusively for its own use. The Planning and Research Department simply budgets its payment for its port line as a budget item under contractual services.

Thus, although CAI receives a substantial amount of funding and has a separate project account, the innovation is not really a formal part of the district or school budget. Similarly, because it does not appear as a part of the annual budget, the CAI system is not considered in discussions of budget increases or cuts. Other kinds of budget cuts can of course indirectly affect the CAI system—e.g., when special project funding is reduced.

Budget decisions directly affecting CAI are made at the individual school level by the principal or the principal and faculty. In the three budget cycles that have been completed since the implementation of CAI, only four schools have reduced their use of CAI. However, most of the respondents agreed that it would be difficult to eliminate the CAI project altogether because of its support through discretionary funding.

Fortunately, most of the users will be facing declining costs for CAI in the future as the lease-purchasing agreements for the computer equipment expire. Some of the terminals, like the three HP 2000s, were also acquired under a lease-purchase agreement. The growth in the number of users has allowed some of this equipment to be paid off earlier than anticipated. Currently, one of the minicomputers and all of the terminals are owned by the schools, after four years on the system. The only charges to the schools are for maintenance. It is interesting to note that if a school drops out of the system at any point, it automatically forfeits its accrued payoff for the central costs. It may keep any terminals or other peripheral equipment which have been purchased, but it is disconnected from the HP 2000.

Personnel and Training

The CAI system has no full-time staff of its own, i.e., paid out of project funds. Instead, the two staff members assigned to CAI are employees of other departments diverted from other duties to operate the innovation. The CAI coordinator, in place since 1975, is a regular senior systems analyst for the DSD. Although there is no job description for the coordinator's role, there is general agreement within the DSD administration that the position should be formalized in the near future.

The other staff member to work on the innovation is a district-wide resource teacher for computer science, hired in 1975 as a part of the curriculum staff but paid through the federal Comprehensive Employment and Training Act (CETA). While the coordinator spends most of his time dealing with the technical aspects of the innovation, the resource teacher is primarily responsible for teacher training and program development. She will respond to principal or teacher requests for help, advise on the use of books and software programs, solve minor technical problems,

and work directly with students who want more instruction in programming. The district has recently recognized the need for a full-time person in this capacity and intends to make the position permanent when the CETA funds expire.

There are several other district personnel who work on CAI on a part-time basis. A few of the curriculum specialists in mathematics and languages are active in showing teachers how CAI can be used in their classes and in coordinating supplementary materials. At each participating school, there is also a time share coordinator who helps train teachers and who handles the scheduling of the terminal(s). The school coordinators are not paid extra for their additional responsibilities, but they do gain slightly more access to the terminal(s). All of the school coordinators will meet three to four times a year with the main CAI coordinator to exchange ideas.

If several teachers in one school are interested in CAI, the resource teacher will give a training class. In fact, CAI has an extensive in-service training component. One course is a "get acquainted" series that covers the CAI concept, available programs, operation of the terminal, and practice. A second course covers the BASIC programming language to enable the teacher to write his or her own programs (about half of the teachers on the system do their own programming). Teachers receive one full unit of district credit for attending each course; the course is held after school for eight weeks and is usually open to any interested teacher. However, it is difficult to estimate the number of teachers in the district who have either received some training or who currently use the CAI system.

The district has occasionally sought outside technical assistance for CAI, both in hardware maintenance and in programming. San Diego contains a large number of private computer firms, and many of the parents in the community are affiliated with or knowledgeable about computer systems. A group of experts from the community was used by the district to help establish a summer computer program. Since 1973, however, the technical expertise for CAI has all been provided by the DSD and outside assistance is no longer used.

While much of the necessary technical expertise has been internalized in the CAI project through the assignment of the two full-time staff, the problem solving capacity of the project has been maintained through a very low turnover among all of the personnel involved. There has been no turnover among the DSD staff people involved in the innovation, and the curriculum specialist involved in the early administration of the project is still active. The majority of school coordinators have remained in that role since the system was initiated, even though they may now be assigned to different schools. Thus, the only significant personnel change was the shift of administrative responsibility to the CAI coordinator in 1975.

There has been no apparent change in the procedures for teacher certification or evaluation as a result of the innovation. An ability to use CAI and to operate computer terminals has not been integrated with any teacher job description or promotional considerations. It has, however, been used as an informal criterion in tranferring teachers. For example, many of the teachers assigned to the three new schools that opened in 1976 had CAI training.

Organizational Governance

Because the CAI only exists as a special project and a separate cost account,

there has been no need for a reorganization of administrative units to accommodate the innovation. There has not been sufficient need to create a separate Computer Sciences Department or to have a distinct CAI section with the DSD.

Similarly, there have only been minor changes in the forms and paperwork of the district due to CAI. Among the changes, the CAI coordinator has created a new billing form to send to the schools. In addition, the various curriculum departments are just beginning to adopt textbooks that are geared to CAI programs or that have computer programs integrated with the text material. The mathematics department, for example, is revising its textbooks (done every five years) and selecting a few books that incorporate BASIC programming.

The innovation has been strictly a grass roots effort since 1972 and has succeeded in spite of the absence of explicit administrative or legislative mandates. CAI has been supported, however, through a district bond issue initiated in 1975. The bond issue officially amended the list of standard equipment for schools to include four computer terminals per high school and two terminals per junior high school. The bond issue provided the capital funds for each school to make computer-related purchases. Thus, although CAI itself is not formally established by district policy, the equipment to operate the system has in part been financed by a public mandate.

Centrally, the procedures for purchasing the terminals and other hardware for CAI are the same as those for purchasing any piece of computer equipment. These procedures were previously established by the DSD and have not been modified for the innovation. Individual schools do have the option of purchasing terminals, printers, etc. directly from private suppliers without consulting the DSD or the CAI coordinator, but it is generally discouraged. The coordinator wants to avoid the problems of inferior equipment and weak maintenance contracts and so has established the policy that if a school does have a direct contact with a supplier, the school cannot use the CAI account to cover the cost of the equipment.

The innovation has not been a part of any collective bargaining sessions or the subject of any other union-related discussions.

Maintenance and Repair

Once a terminal has been installed, the school is responsible for requesting the supplies—e.g., ribbons—to maintain the terminal. The maintenance needs of the terminals are actually minimal. Minor operational malfunctions are often corrected by the teacher using the terminal, because most of the teachers have completed a one and one-half hour maintenance and repair course. Serious equipment malfunctions are repaired by a maintenance firm

or, in the case of couplers, by the district's audio-visual repair shop.

Prior to 1975, all of the maintenance and repair work was included in a service contract between the school district and the terminal suppliers. All of the servicing for the minicomputers was performed by the DSD personnel. In 1975, the DSD entered into a single, full-maintenance contract with all of the schools. As a service bureau, the DSD now provides all repair and servicing of equipment on a formal, paid basis through a third party.

The CAI system has continued to expand the number of users and the amount of equipment. Although the additional minicomputers do not represent a newer

generation of equipment, there is a new generation of terminals. In 1975, the CAI coordinator convinced the schools that they could purchase a quieter and faster terminal at a lower cost than they had been paying for their teletype terminals, and a newer generation of terminals was phased in over an eight-month period. Today, it is up to each school to decide whether it wants to upgrade its equipment further and to select new terminals.

The number of software programs available through CAI has been gradually reduced. Under lease-purchase, the minicomputers came with 1,300 pre-packaged programs ranging in level from elementary through college graduate courses. The coordinator noted that many of the upper-level programs were never accessed and were simply a burden to the system. He and the resource teacher have since reviewed most of the programs in the library and removed many of them. In 1976, the number of programs was reduced to 950, and in 1977 it was further reduced to 750; any program thus removed can be replaced upon request.

The only other modification made by the DSD staff has been the upgrading of the HP system to allow an interface with the district's IBM system.

D. REASONS FOR ROUTINIZATION STATUS

Service Applications and Outcomes

H_1 (core application): CAI has provided teachers with a useful instructional tool in mathematics, science, language, and social studies. Using a terminal located in the school, the teacher can assign individualized programs to help students to correct their deficiencies. The drill-and-practice technique is used to help students master routine procedures, while enrichment programs enable the student to explore areas on his own that the teacher would not otherwise have time to cover. The innovation is clearly a supplement to the existing instructional programs and has not replaced any of the existing functions.

H_2 (competition): Each participating school has at least one port and one terminal on-site. The terminal can be used for a variety of purposes ranging from instructional to administrative applications. As interest in the CAI program grows at each school, conflicts can arise among (a) teachers wanting to make assignments for students, (b) teachers wanting to do their own programming, (c) administrative uses such as recordkeeping, and (d) students wanting to do their own special projects. The conflict is usually a scheduling problem and will be resolved by the time share coordinator for the school. Ultimately, it is the principal's decision as to how the terminal will be used and who will receive priority in scheduling. In those cases where some conflict has occurred, the school has acquired a second terminal and port before the problem has become too severe.

H_3 (service-related payoffs): There has been no formal evaluation of CAI during its operation, but those affiliated with the innovation do perceive that there are definite benefits from having it. The primary benefits go to the teacher in three ways. First, the teacher is able to provide the student with additional instruction in a problem area via CAI, thereby allowing more time to work with other students having special problems. Second, the teachers can use their CAI training as a bargaining tool with the principal for classes they want to teach—e.g., handling CAI in return for being able to teach a favorite class. Third, the teachers are able to gain

advanced credit (and therefore more pay) for undergoing the two training courses offered for CAI.

The administration appears to benefit from the cost savings involved in the innovation. The cost for one student to work through an instructional program at the terminal for an hour is $1.18, whereas the cost for a teacher's aide to provide the same individualized instruction for an hour is $3.09. As school budgets are cut back, the innovation becomes a more attractive way to provide routine instruction and practice.

The CAI system has not been without its problems, however. One problem encountered early in the project was the tendency for certain teachers to monopolize the use of the terminals. It was only when the coordinator explained to the teachers that their department within that school would have to bear the full costs of funding the terminals that the teachers became more willing to share with others. The related problem of a few students monopolizing the terminals has been partially resolved by better supervision of the terminals.

New principals have sometimes posed a problem because they are often unfamiliar with CAI. They may not wish to continue the school's commitment to CAI, and make the decision in September although all CAI arrangements have already been settled for the school year. In such cases, the CAI personnel or the head of the DSD is usually able to show the principal the value of retaining the innovation.

Perhaps the most serious problems occur during in-service training when teachers are first exposed to the new technology. Some of the teachers lack the typing skills necessary to operate the terminal. Others are reluctant to admit they do not know anything about CAI even though their students are already using the terminals. Finally, some teachers are simply afraid of the machine; they are accustomed to having complete control over a situation, and they are not really certain what will happen when they press the "send" button.

External Environment

H_4 (crisis conditions): The adoption of the innovation was neither the result of a crisis condition faced by the district nor attributable to a chronic deficiency in instructional functions. Rather, it was the result of several teachers' perception that computers could be a useful tool in the classroom: some types of instruction and practice could be handled by pre-packaged programs, and students could be taught about computers and computer programming. As teachers saw the success that CAI was having in the mathematics curriculum, they started applying it to similar problem areas in their own subjects.

H_5, H_6 (client-community support): There are only a few individuals outside the district who are aware of the CAI project. Some of the other institutions that use CAI would be able to advocate the system's continuation, and there are several other private schools that might be interested in purchasing CAI time from the system. In general, there has been very little publicity about the innovation, and because CAI does not require the use of community resources nor affect anyone in the community, there are no community groups to support or oppose it.

The parents of students who use CAI support the project, however. Many of these parents have a computer background and can readily understand the objectives and operation of the innovation. Other parents have simply seen their children take a new interest in school and spend many hours using the terminals. The

parents are not formally organized to support CAI except through PTAs, but the fact that several of the PTAs have made donations to the project would indicate a strong support for it from at least some parents.

Internal Characteristics

H_7 (administrators): During the early 1970s when the interested mathematics specialist was trying to marshal support for CAI, there was very little support from the top administration. The superintendent felt that the time for funding unusual projects had passed, and the school board was reluctant to provide any funding. The few summer pilot programs were funded from private contributions and from discretionary funds in the mathematics department budget. When the DSD director and math specialist presented the idea to the board that the innovation be self-financed through the participating schools, however, the board gave its approval.

Although the board concurred that the project was worthwile, there was still no strong support behind it. As the project expanded, the board became more familiar with its objectives and teacher support; at least one board meeting was held in a room with the CAI terminals and included a program by students to explain the system. In 1975, the board agreed to modify the standard list of equipment for schools to include computer terminals, and it included funds for purchasing terminals in the bond issue.

The key support for the innovation has come primarily from the director of the DSD and the math specialist. Once he had been approached by the teachers, the director helped to get other schools interested, made available the initial funding for the CAI equipment, and supported the schools during the summer funding gaps. Later, he assigned one of the DSD systems analysts to the CAI project full time, requested the special accounting category for the innovation, and supported the hiring of a full-time resource teacher.

Also important to the success of the innovation has been the support of the principals. Because they provide the actual funding for the system, they are the administrators who must make the greatest commitments. They not only provided funding but also spoke to the central administration on behalf of the project. Thus, it is mainly their decision whether or not the innovation will continue.

H_8 (innovator): The role of innovator has been shared by several individuals during the system's evolution. A curriculum specialist in the mathematics department was the first to be responsible for developing school support for the innovation and for establishing the procedures for acquiring equipment and for billing. He also allocated a portion of the department's discretionary funds to pay for time sharing and for the instructional materials needed to train teachers. During the time the specialist was coordinating the project, the DSD director was active in allocating his staff for technical support and creating the accounting procedure for funding.

The role of coordinator was shifted to the current incumbent in 1975. His assignment from within the DSD combined the tasks of technical support with administrative responsibility for the system. Perhaps the coordinator's greatest contribution to the innovation is his enthusiasm and ability to provide schools with new ideas on uses for CAI.

H_9 (practitioners): The adoption, implementation, and growth of the innovation has been essentially a grass roots movement on the part of teachers. A core

group of interested teachers, primarily from the mathematics departments, supported the CAI concept and convinced other teachers of its potential value. Although a few teachers did object to the innovation in faculty meetings (usually in favor of other budget priorities), there was little opposition. Many teachers no doubt resist the project because of lack of training or a fear of the computer, and they simply avoid using the innovation. The growing demand for terminals and training, however, indicates growing support among practitioners. The respondents agreed that the teachers would most liklely voice strong resistance if the CAI system were to be removed.

Support for the innovation has developed among department heads as well. As more and more departments invest in materials geared to CAI, they have a greater stake in its continuation. Further, the departments have realized the advantages of using CAI to increase the capacity of teachers to deal with student problems. Departments have also been investing their own discretionary funds in the innovation and in the training of their teachers.

For most teachers, the innovation is not associated with career advancement or monetary reward. There are some teachers who do benefit from involvement in CAI because of the district credit (one unit for each eight-week course) given for in-service training. The credit counts on the district pay scale for teachers and toward consideration for transfers. Thus, the innovation and related training can, in conjunction with other educational activities, be an incentive to a teacher.

H_{10} (adversary group): There are no organized groups within the district who oppose the CAI system. Because the approval for participation in the CAI system is an annual decision by the principal and faculty, there are always a few teachers who may advocate reallocating the funds for other purposes. In only three schools has the decision been made to drop a part or all of CAI and to use the money in other ways. Thus, the potential exists for supporting an alternative innovation or project, but there is no strong opposition to the CAI system.

HILLSBOROUGH COUNTY SCHOOL DISTRICT
TAMPA, FLORIDA

Persons interviewed:

Supervisor of Mathematics (Secondary Education)
Director of Data Processing
Programmer in data processing
Assistant Superintendent for Instruction
Head of Mathematics Department, Brandon High School
Mathematics teacher, Brandon High School
Mathematics teachers in other high schools, who gathered for a workshop session

A. BACKGROUND

The Hillsborough County School District (somewhere between the 20th and 25th largest in the country) was the site for a field visit on computer-assisted instruction. The school district covers the area around Tampa, Florida, has about 120,000 students, an annual operating budget of about $136 million, and about 13,000 employees. Pertinent to the site visit is also the fact that there are 11 senior high schools, which have been the main participants in the CAI system.

B. THE INNOVATION

The school district grew steadily until 1973, after which enrollment leveled off somewhat. The development of the CAI system is tied closely to the development of the school's computer system, which began in 1961 (an IBM 402) with an emphasis on school-related applications (e.g., grade reporting, student scheduling, and testing). Such applications are considered by data processing officials to be neither business applications (e.g., payroll, finance, property accounting), which were added in 1963, nor instructional applications (e.g., drill and practice and advanced computer mathematics), which began in 1972. At the time that the IBM 402 was initiated, the head of the data processing unit was first appointed (a position that is still held by the same person). The data processing unit had begun as part of the administrative operations of the school district, but for the last eight years it has been under the direction of the assistant superintendent for business and research. The current utilization rates for the computer system are divided roughly one-third each for school-related applications, business applications, and instructional applications.

The main instructional application is related to the teaching of computer programming (BASIC), and regular and advanced computer mathematics courses. There is only minimal use of the system for routine classroom applications—i.e., for drill and practice, for portions of regular mathematics classes, or for portions of classes other than mathematics. The computer science interest has been quite high, however, and because of the time-sharing limitations in the current system, several high schools have been considering the purchase of minicomputers (one high school, Brandon, purchased an Altair model and began using it during the current year). The minicomputers allow a school to have on-site capabilities and support the

use of at least one additional terminal (which can be a CRT terminal with or without a printout capability). The total cost of Brandon's minicomputer was about $8,000, with the funds coming from the capital budget in relation to the addition of a new wing for the school building; maintenance for the minicomputer is provided by the regular school maintenance shop, so that the high school itself has required few funds to support the computer following the initial outlay. Other schools that are considering the purchase of minicomputers hope to be able to use capital budget funds in a similar manner.

C. STATUS OF ROUTINIZATION

Budget and Equipment

The central data processing operation currently has about 37 full-time staff and a budget of about $1 million annually. The budget support has been almost totally derived from local funds, with the few exceptions being small grants from LEAA (which was for a juvenile home project and which supported the purchase of some software) and the Office of Education, Title III (which was for a student grading project). Of the $1 million, about $350,000 is for hardware, $525,000 for personnel, $135,000 for paper, $25,000 for software, and $35,000 for other expenses. The core computer was purchased in 1972, with the earlier generations having been leased. District officials have been pleased with the purchasing agreement, because it has reduced costs in the long run and because the current computer still has considerable resale value. In fact, because of continued demands for more computer time, the officials are considering new ways of increasing the core capacity, and a purchasing arrangement would be the most desirable for whatever new equipment is involved. Although there have been no formal studies of the cost savings attributable to the computer operation, the system has recently assumed the responsibility for a substantial test-scoring job that had previously been subcontracted to an outside computer firm (at a cost of about $150,000).

The costs for renting the CAI terminals and telephone lines average about $100 per month per terminal. These costs, in contrast to the costs for maintaining all central equipment, are part of the budget of the instructional (curriculum) department, and the use of the CAI terminals has been coordinated by the mathematics supervisor. There appears to be continued demand for additional terminal time among the high schools. The main constraint has been a shortage of ports and the limitation in central processing capability, rather than the unavailability of funds.

In summary, budgetary support for the CAI system has mainly been from local funds, with little transition required from federal or other outside grants to such local support. The system has also moved from a leasing to a purchasing arrangement for the core computer, and the staffing requirements all appear to be an integral part of the school budget. There is every indication that, from a budgetary standpoint, the computer system would be treated as any other item in the budget, whether there were increased or decreased funds available.

The core computer is now in its fourth generation. Following the IBM 402 were an IBM 1401 (installed in 1963), an IBM 360 (1969), and an IBM 370/135 (1972). The current system is compatible with the Hillsborough County computer (which serves county-level agencies), and each serves as a backup system for the other. Some batch processing of instructional applications was done on the IBM 360, but the

major CAI applications began in 1972 with the IBM 370/135, when nine teletype terminals were placed in the high schools. There are presently ten such terminals, divided among the 11 high schools (one high school without a terminal), and these terminals share four of the ports to the core computer. (The other four ports are used by CRT terminals in relation to non-instructional applications.)

Personnel and Training

Because the major instructional application has been in the mathematics area, the CAI system is coordinated by both the data processing unit and the supervisor for mathematics instruction. As previously noted, the CAI-related costs are shared between the data processing unit and the instructional department. Both the head of the data processing unit and the mathematics supervisor are the first incumbents to have held their positions since the initiation of CAI. Some CAI planning had been done by the mathematics supervisor's predecessors, however. In addition, initial enthusiasm in CAI had been shown by both the science supervisor and mathematics supervisor, but the advanced computer courses were accepted by students as part of their mathematics rather than science (e.g., engineering) electives. As a result, there appears to be little interest in CAI on the part of the science supervisor (or by most of the supervisors of other subjects, either).

As for the data processing personnel, their job classifications and entrance exams have been covered since 1970 under the Hillsborough civil service system (rather than the school system), which has meant that: (a) the classifications and salaries have been competitive with those in other industries, and (b) there has been little of the undesirable competition between instructional and non-instructional jobs.

All high school mathematics teachers have had at least one opportunity to participate in in-service training courses for using CAI. Such courses were offered regularly by the instructonal department (with assistance from a vendor) until most of the mathematics teachers had been exposed to the training, but are now only offered sporadically. There is no formal requirement for new teachers to have CAI training, but the local university from which most of the teachers are recruited has incorporated a CAI course into its curriculum.

Organizational Governance

There appear to have been no specific laws or regulations that have affected the computer operation. The state has recently passed an accountability law that will increase pressure to provide compensatory training (if necessary) to students who cannot pass a criterion level in mathematics or reading. However, how this law will be implemented (the first round of testing will be next year) and what its effect will be on the computer system is unclear. As for textbook adoption (e.g., for CAI-oriented algebra books), this issue is not relevant because CAI is not regularly used for the general mathematics classes; the computer mathematics classes, of course, do have special texts.

D. REASONS FOR ROUTINIZATION STATUS

Service Applications and Outcomes

H_1 (core application): The computer system, as previously noted, is used for school-related applications, business applications, and instructional (CAI) applications. There is little doubt that the computer operation now performs many essential functions in the first two areas. In instructional applications, however, the main application has been for computer science and advanced mathematics students (e.g., courses in BASIC as well as computer mathematics) rather than for the core curriculum. This means that students are exposed to CAI either as part of an elective course or as an additional activity in which advanced students can conduct special problem-solving exercises (such exercises may include the development of a program to produce different versions of the same type of test to help a teacher minimize cheating in a regular mathematics class). Because these applications are limited to a minority of the students, most of the students and teachers can continue their functions without involvement with CAI. In contrast, CAI could be deemed a more integral part of the curriculum if it involved the drill and practice applications associated with regular mathematics or science classes, or if it involved the problem-solving applications associated with regular courses in algebra, geometry, trigonometry, and so on. Thus, unlike the school-related and business applications, the CAI applications do not appear to have displaced core functions.

H_2 (competition): To a certain extent, the fact that the computer tends to perform essential functions in the school-related and business areas but more peripheral functions in the instructional area is evidenced by the competition and priorities among applications. First, half of the ports for terminals are dedicated to administrative applications, and only the other half (four ports) are dedicated to the CAI terminals. This allocation has continually caused scheduling problems among the schools, which must share the ports, and the CAI lines appear to be in continual use. (Two or three schools are explicitly assigned to each port line; if a line is exceedingly busy, a school that wants some teletype time will telephone the sharing school(s) to indicate its needs. Thus, the sharing arrangements are maintained without having to go through the central facility.)

In general, the data processing unit has attempted to maintain a one-third split among the three broad areas of applications, but the CAI applications naturally require much less in CPU time. Secondly, the current considerations for expanding the computer system are primarily based on anticipated increases in school-related and business, but not CAI, applications. Instead, the major CAI expansion is likely to occur through individual schools acquiring their own minicomputers, so that the CAI applications are likely to be less centralized in the future.

H_3 (service-related payoffs): The biggest service related payoffs have been in the test-scoring applications, which have saved both money and teacher time. The saving of time previously devoted to grading tests is appreciated by the older teachers who have had to perform such functions before the installation of the computer system. The cost savings have only been informally documented. It is known, however, that a California company previously had a contract to distribute, collect, and score certain elementary school tests. By performing this application by itself, the data processing unit saved the district $150,000. Moreover, high school

test-scoring will be conducted by the data processing unit this year, which will produce further savings. As yet, the CAI applications appear to have had no documented effect in terms of cost savings or specific service payoffs—e.g., examples of students who had performed exceedingly well in school (or after graduation) as a result of CAI. An implicit service payoff has been the general acknowledgment that computers are part of contemporary life, so that any exposure to computer techniques will help a student in his or her subsequent career.

External Environment

H_4 (crisis conditions): The computer operation did not emerge because of a crisis. In 1961, when the first computer was acquired by the district, it was a result of the efforts of a group of five high school principals who were interested in computer applications in the area of student administrative records. Most school districts that used computers at that time had systems oriented toward business applications. The Hillsborough system, however, started out with school-related data processing because of the influence of the initiators.

An additional early factor was that the supervisor of mathematical instruction for the district had attended a computer workshop in the summer of or 1970. At that time, he was chairman of the mathematics department in one of the high schools. He became very interested in computers and in 1970-71 he and another teacher team-taught FORTRAN, using a Wang-370 programmable calculator. He also made an arrangement with the head of data processing to process student jobs in batch mode. Even though there were problems, the supervisor was highly enthusiastic about computers. He was promoted to his present position of supervisor in the fall of 1971, just in time to be able to help develop the request for proposals (RFPs) that the district was issuing for bids on a new computer system (which eventually became the IBM 370/135). During his first year as supervisor, he also bought a portable Wang-3330 computer, which he used to train teachers and to generate enthusiasm for the computer as an instructional tool.

The specifications for the new system mandated that the vendor provide software to support cathode ray tubes (CRTs), teletypes, and CAI applications. This was the first time instructional applications were included in the computer system on an interactve basis.

H_5, H_6 (client-community support): Two students were interviewed who were especially enthusiastic supporters of the computer. They appeared to have spent much time with the terminals during after-school hours, and they were mainly challenged by having to create computer programs for solving a variety of problems. However, these students were probably exceptions to the average member of the student body. Most students do not come into contact with CAI. Those that do are enrolled in computer mathematics courses. Other than the very enthusiastic support of a few students, the students in general may thus not be unusually supportive of CAI. In fact, a contrasting report was made by a mathematics teacher at one school (the school has been one of the most infrequent computer users) who is the only one in the school who knows any programming. Her computer science course is part of the honors program, but her description of her students was at variance with the notion of honor students. She said they were apathetic and that they only took the course to fill up their schedules.

According to the head of data processing and the supervisor for mathematical instruction, the community is generally unaware of the computer system, and therefore there is no active support. There has been an occasional newspaper article on CAI, but such publicity has been minimal.

Internal Characteristics

H_7 (administrators): The computer system falls under the overall direction of the assistant superintendent in charge of business and finance. The assistant superintendent in charge of instruction also has contact with the computer system, mainly for its CAI applications. It is difficult to establish the degree of support for the computer system by either of these persons. However, as for other instructional innovations, the district is involved in CCTV in a minor way. At least one high school in the district is fully equipped for CCTV, and the district has had a mobile TV unit for the last several years. One innovation that appears to generate more interest among administrators, possibly because it is in the process of being installed, is a word-processing unit in the elementary education department.

H_8 (innovator): For the computer system, the role of innovator is shared between the head of data processing and the mathematics supervisor. The data processing director has guided the district through three new generations of computers and has coordinated both the preparation of applications programs and their priorities of usage. The department grew under her direction to its present staff of 37 people. The group provides the technical expertise required by teachers (or administrators). The innovator for the instructional applications alone, however, is more clearly the supervisor of mathematical instruction.

If the director of data processing were replaced, the system would probably continue in its present state. However, if the supervisor of mathematical instruction were replaced, the instructional applications could possibly diminish unless his replacement happened to be another computer enthusiast.

H_9 (practitioners): The only teachers who use the system at present are mathematics instructors. However, the number of these instructors who are involved may be limited. For instance, in the most active user-school, only two mathematics teachers appear to use the computer. Other departments such as science, business, language, and social studies appear not to be involved in CAI at all. One potential barrier is that the drill and practice and other CAI applications that might be appropriate for the average student require some administrative procedures in which many teachers have not been trained. For instance, a teacher would not only have to be taught the mechanics of switching onto and off of the computer and using special computer programs, but would also have to know all the administrative procedures involved in registering and monitoring each student. Also, the teletype terminal is inappropriate for drill-and-practice applications because it is too slow and cumbersome, and only one student would be able to work on a program at a time (because of the limited number of terminals).

Thus, except for the enthusiastic backing of several mathematics teachers, CAI does not appear to have active supporters among the staff. The same is probably true among the instructional supervisors, where the mathematics supervisor is the major supporter, but where there may be little interest among the supervisors of other subject areas.

H_{10} (adversary group): There appears to be little opposition to the use of CAI. The supervisor of mathematical instruction of the district does encounter resistance on the part of the supervisors in other instructional areas when he tries to persuade them to use the computer. From his perspective, they do not appear interested. There is also some resistance among department heads and teachers in the schools, primarily from those who view CAI as an undesirable substitute for the more traditional methods of learning mathematics. There appears, however, to be no active opposition to CAI.

Appendix D

RESPONSES TO 90 TELEPHONE INTERVIEWS[1]

Number	Variable and Coding Categories	Number	Percent
001	Case Number		
002	Type of Innovation		
	Police computer	13	14.4
	MICU	16	17.8
	CAI	16	17.8
	CCTV	14	15.6
	Jet-Axe	15	16.7
	Breath testing	16	17.8
	Total	90	100.0
003	City Code (see Table 2 of text)		
004	Type of Respondent		
	Chief of service	1	1.1
	Administration staff head	16	17.8
	Line staff head	19	21.1
	Administration staff	30	33.3
	Line staff	24	26.7
	Total	90	100.0
005	Innovation Use		
	Currently in use	78	86.7
	No longer in use	12	13.3
	Total	90	100.0
006	Innovation Use (same as 005)		
	Total	90	100.0
007	Administration of Innovation		
	By department alone	84	93.3
	By department with another agency	5	5.6
	No response	1	1.1

[1] These responses were coded from the six original instruments found in Appendix B. Wherever possible, identical questions were used in each instrument and coded here; in other cases, the final codes are based on similar questions from each instrument.

Number	Variable and Coding Categories	Number	Percent
	Total	90	100.0
008	Number of Preceding Models of the Innovation		
	0	26	28.9
	1	21	23.3
	2	14	15.6
	3	10	11.1
	4	2	2.2
	Not applicable	17	18.9
	Total	90	100.0
009	Year Innovation First Used		
	1965 and before	18	19.9
	1966-1970	27	30.1
	1971-1975	33	36.6
	1976 to present	4	4.4
	No response	8	8.9
	Total	90	100.0
010	Size of Innovation (see special code after Q.78 at end of this list)		
011	Equipment Ownership Status		
	Purchased	65	72.2
	Leased	1	1.1
	Lease-purchase plan	7	7.8
	Not applicable	16	17.8
	No response	1	1.1
	Total	90	100.0
012	Year of Equipment Purchase		
	1965 and before	4	4.4
	1966-1970	18	19.9
	1971-1975	35	38.9
	1976 to present	6	6.7
	Not applicable	16	17.8
	No response	11	12.2
	Total	90	100.0
013	Number of Years of Lease (applicable to less than 25 percent of cases)		
014	Initial Technical Assistance		
	From manufacturer	30	33.3
	From another agency	1	1.1
	From a university	2	2.2
	From consultants and/or manufacturer	23	25.6
	Combination of above	10	11.1
	None	22	24.4
	No response	2	2.2
	Total	90	100.0

Number	Variable and Coding Categories	Number	Percent
015	Continuing Technical Assistance		
	From manufacturer	11	12.2
	From another agency	1	1.1
	From a university	3	3.3
	From consultants and/or manufacturer	23	25.6
	Combination of above	4	4.4
	None	48	53.3
	Total	90	100.0
016	Provisions for Repair and Maintenance		
	Contract with manufacturer	33	36.7
	Contract with other outside group	6	6.7
	Performed in-house	26	28.9
	Provided by other agencies	9	10.0
	Not applicable	15	16.7
	No response	1	1.1
	Total	90	100.0
017	Number of Coordinators (full-time equivalent)		
	Less than 1	7	7.8
	1	45	50.0
	2	3	3.3
	3	3	3.3
	Not applicable	31	34.4
	No response	1	1.1
	Total	90	100.0
018	Is Coordinator's Position Permanent?		
	Yes	50	55.6
	No	1	1.1
	Not applicable	31	34.4
	No response	8	8.9
	Total	90	100.0
019	Is Coordinator Position Primarily Classified in Personnel System?		
	Yes	32	35.6
	No	19	21.2
	Not applicable	31	34.4
	No response	8	8.9
	Total	90	100.0
020	Number of Mid-level Staff Positions (full-time equivalent)		
	Less than 1	22	24.4
	1-10	17	18.9
	11 or more	3	3.3
	Not applicable	31	34.5
	No response	17	18.9
	Total	90	100.0

Number	Variable and Coding Categories	Number	Percent
021	Are Mid-level Staff Positions Permanent?		
	Yes	17	18.9
	No	2	2.2
	Mixed	1	1.1
	Not applicable	31	34.4
	No response	39	43.3
	Total	90	100.0
022	Are Mid-level Positions Formally Classified in Personnel System?		
	Yes	15	16.7
	No	5	5.6
	Not applicable	31	34.4
	No response	39	43.3
	Total	90	100.0
023	Number of Support Staff Positions (full-time equivalent)		
	Less than 1	8	8.9
	1-10	21	23.3
	11-20	6	6.6
	21 or more	6	6.6
	Not applicable	31	34.5
	No response	18	20.0
	Total	90	100.0
024	Are Staff Support Positions Permanent?		
	Yes	32	35.6
	No	0	0
	Mixed	2	2.2
	Not applicable	31	34.4
	No response	25	27.8
	Total	90	100.0
025	Are Support Staff Positions Formally Classified in Personnel System?		
	Yes	19	21.1
	No	10	11.1
	Mixed	4	4.4
	Not applicable	31	34.4
	No response	26	28.9
	Total	90	100.0
026	Is the Use of the Innovation Part of an Employee Examination?		
	Yes, civil service	10	11.1
	Yes, other than civil service	45	50.0
	No	14	15.6
	Not applicable	15	16.7
	No response	6	6.7
	Total	90	100.0

Number	Variable and Coding Categories	Number	Percent
027	Number of Coordinators throughout Innovation's History		
	0	1	1.1
	1	42	46.7
	2	18	20.0
	3	8	8.9
	4	7	7.8
	5 or more	6	6.6
	No response	8	8.9
	Total	90	100.0
028	Preceding Coordinator's New Position		
	Practitioner	3	3.3
	Head of agency	1	1.1
	Senior supervisor	8	8.9
	Administrator	2	2.2
	Junior supervisor	8	8.9
	Technician	1	1.1
	Outside of agency	5	5.6
	No response	53	58.9
	Total	90	100.0
029	Innovator's Position at Time of Adoption of Innovation		
	Head of agency	14	15.6
	Staff person in agency	29	32.2
	Staff person in other agency	9	10.0
	Outside city government	4	4.4
	Group of innovators	1	1.1
	Combination of above	10	11.1
	Other	12	13.3
	No response	11	12.2
	Total	90	100.0
030	Is Innovator Still with Department?		
	Yes	43	47.8
	No	16	17.8
	No response	31	34.4
	Total	90	100.0
031	Innovator's Current Position		
	Practitioner	5	5.6
	Head of Agency	11	12.2
	Senior Supervisor	17	18.9
	Administrator in Agency	6	6.7
	Junior supervisor	2	2.2
	Retired	3	3.3
	No response	46	51.1
	Total	90	100.0
032	Prior Need for Innovation		
	Increasing service demands	17	18.9
	Specific need	14	15.6
	Other reasons	49	54.4
	Not applicable	6	6.7
	No response	4	4.4
	Total	90	100.0

Number	Variable and Coding Categories	Number	Percent
033	Primary Source of Software		
	In-house	18	20.0
	Other agency	1	1.1
	External group	8	8.9
	Prepackaged programs	13	14.4
	Users of innovation	2	2.2
	Other	1	1.1
	Not applicable	47	52.2
	Total	90	100.0
034	Source of Current Operating Funds for Innovation		
	Regular agency budget	63	70.0
	Other funds, excluding federal	3	3.3
	Federal funds	4	4.4
	Combination of above	1	1.1
	Other	3	3.3
	No response	16	17.8
	Total	90	100.0
036	Formal Organizational Status (no meaningful responses)		
037	Source of First External Funds		
	LEAA or revenue-sharing	10	11.1
	State government	12	13.3
	Department of Transportation or Public Broadcasting Service	19	21.1
	Department of Health, Education, and Welfare	22	24.4
	National Science Foundation	3	3.3
	Private organization	1	1.1
	Unidentified	3	3.3
	No response	31	34.5
	Total	90	100.0
038	Year in Innovation's History That External Funds Were First Used		
	Same year that innovation was adopted	32	35.8
	A year or more after innovation had been adopted	30	33.1
	No response	28	31.1
	Total	90	100.0
039	Amount of First External Funds		
	$0-5,999	12	13.3
	$6,000-10,000	10	11.0
	More than $10,000	14	15.6
	No response	54	60.0
	Total	90	100.0
040	Source of Second External Funds (applicable to less than 25 percent of cases)		

Number	Variable and Coding Categories	Number	Percent
041	1976 Budget for Innovation		
	$0-50,999	16	17.6
	$51,000-100,999	6	6.6
	$101,000-500,000	13	14.3
	More than $500,000	3	3.3
	No response	52	58.2
	Total	90	100.0
042	1975 Budget for Innovation		
	$0-50,999	18	19.9
	$51,000-100,999	5	5.5
	$101,000-500,000	9	9.9
	More than $500,000	2	2.2
	No response	56	62.4
	Total	90	100.0
043	1974 Budget for Innovation		
	$0-50,999	20	22.0
	$51,000-100,999	4	4.4
	$101,000-500,000	8	8.8
	More than $500,000	1	1.1
	No response	57	63.8
	Total	90	100.0
044	Have There Been Organizational Changes Related to the Innovation?		
	Formal changes	23	25.6
	Less formal changes	14	15.6
	No changes	19	21.1
	Other	17	18.9
	Not applicable	15	16.7
	No response	2	2.2
	Total	90	100.0
045	Is There Dedicated Space for the Innovation?		
	Yes	48	53.3
	No	26	28.9
	Mixed	11	12.2
	No response	5	5.6
	Total	90	100.0
046	Is the Use of the Innovation Mandated by Law?		
	Yes	5	5.6
	No	54	60.0
	Not applicable	31	34.4
	Total	90	100.0
047	Is the Use of the Innovation Regulated by Law?		
	Yes	38	42.2
	No	48	53.3
	No response	4	4.4
	Total	90	100.0

Number	Variable and Coding Categories	Number	Percent
048	Was There Any Initial Practitioner Training?		
	Yes, informal	8	8.9
	Yes, given by manufacturer	2	2.2
	Yes, classes held by agency	23	25.6
	Yes, in agency's academy	23	25.6
	Yes, other	9	10.0
	Combination of above	5	5.6
	None	19	21.1
	No response	1	1.1
	Total	90	100.0
049	Has There Been Any Update Training for Practitioners?		
	Yes, informal	6	6.7
	Yes, given by manufacturer	4	4.4
	Yes, classes held by agency	36	40.0
	Yes, in agency's academy	7	7.8
	Yes, other	12	13.3
	Combination of above	7	7.8
	No	9	10.0
	No response	9	10.0
	Total	90	100.0
050	Has There Been Any Service Payoff from the Innovation?		
	Yes, reported or discussed in budget	17	18.9
	Yes, reported in evaluation studies	10	11.1
	Yes, both of above	25	27.8
	Yes, other	14	15.6
	No	1	1.1
	No response	23	25.6
	Total	90	100.0
051	Type of Service Payoff		
	Better information	9	10.0
	Reduced manpower demands	2	2.2
	Expansion of service practices	20	22.2
	Quicker response	13	14.4
	Better output of agency practices	21	23.3
	Coordination of manpower	1	1.1
	Public recognition	2	2.2
	No response	22	24.4
	Total	90	100.0
052	Has There Been Any Resistance from Inside the Agency in Using the Innovation?		
	Yes	48	53.3
	No	42	46.7
	Total	90	100.0

Number	Variable and Coding Categories	Number	Percent
053	If There Has Been Resistance, of What Type?		
	Regarding specific applications	3	3.3
	Only at time of adoption	15	16.7
	Over entire use of the innovation	20	22.2
	Other	8	8.9
	Combination of above	2	2.2
	No response	42	46.7
	Total	90	100.0
054	Has There Been Any Publicity Regarding the Innovation?		
	Yes, local mention	46	51.1
	Yes, national media	1	1.1
	Yes, both of above	23	25.6
	No	19	21.1
	No response	1	1.1
	Total	90	100.0
055	If There Has Been Publicity, Has It Been Favorable?		
	Yes	63	70.0
	Mixed	6	6.7
	Not applicable	19	21.1
	No response	2	2.2
	Total	90	100.0
056	Support from the Mayor for the Innovation		
	Yes	39	43.3
	No	47	52.2
	No response	4	4.4
	Total	90	100.0
057	Opposition from the Mayor for the Innovation		
	Yes	3	3.3
	No	83	92.2
	No response	4	4.4
	Total	90	100.0
058	Support from Other Municipal Officials for the Innovation		
	Yes	44	48.9
	No	44	48.9
	No response	2	2.2
059	Opposition from Other Municipal Officials		
	Yes	6	6.7
	No	82	91.1
	No response	2	2.2
	Total	90	100.0

Number	Variable and Coding Categories	Number	Percent
060	Support from Local Legislators for the Innovation		
	Yes	35	38.9
	No	50	55.6
	No response	5	5.6
	Total	90	100.0
061	Opposition from Local Legislators		
	Yes	6	6.7
	No	80	88.9
	No response	4	4.4
	Total	90	100.0
062	Support from Citizen Groups		
	Yes	31	34.4
	No	57	63.3
	No response	2	2.2
	Total	90	100.0
063	Opposition from Citizen Groups		
	Yes	2	2.2
	No	86	95.6
	No response	2	2.2
	Total	90	100.0
064	Support from Interest Groups		
	Yes	34	37.8
	No	11	12.2
	No response	45	50.0
	Total	90	100.0
065	Opposition from Interest Groups		
	Yes	4	4.4
	No	41	45.6
	No response	45	50.0
	Total	90	100.0
066	Support from Any Other Group		
	Yes	15	16.7
	No	6	6.7
	No response	69	76.7
	Total	90	100.0
067	Opposition from Any Other Group		
	Yes	7	7.8
	No	11	12.2
	No response	72	80.0
	Total	90	100.0

Number	Variable and Coding Categories	Number	Percent
068	Difficulties Foreseen in Operating Innovation during Coming Year		
	Staff training	5	5.6
	Reorganization in department	4	4.4
	Interdepartmental problems	3	3.3
	Overuse or excessive demands	6	6.7
	Legislative or regulatory problems	2	2.2
	Change in basic nature of innovation	2	2.2
	Survival of innovation in doubt	4	4.4
	Other	2	2.2
	No difficulties	62	68.9
	Total	90	100.0
069-071	Questions related to computer innovations only (applicable to less than 30 percent of cases)		
072	Total Number of Groups of External Supporters		
	0	20	22.2
	1	17	18.9
	2	18	20.0
	3	10	11.1
	4	11	12.2
	5	14	15.6
	Total	90	100.0
073	Total Number of Groups of External Opposers		
	0	71	78.9
	1	13	14.4
	2	4	4.4
	3	2	2.2
	Total	90	100.0
074	Extent of Practitioner Use of Innovation		
	None	50	55.6
	Low	11	12.2
	Moderate	13	14.4
	High	16	17.8
	Total	90	100.0
075	Number of Core Applications		
	0	8	8.9
	1	14	15.6
	2	15	16.7
	3	12	13.3
	4	15	16.7
	5	26	28.9
	Total	90	100.0

Number	Variable and Coding Categories	Number	Percent
076	Number of Core Applications among Top Priorities		
	0	41	45.6
	1	15	16.7
	2	10	11.1
	3	21	23.3
	4	3	3.3
	Total	90	100.0
077	Number of Business Applications Performed by Computer		
	0	12	13.3
	1 to 5	8	8.9
	6 or more	9	9.9
	Not applicable	61	67.8
	Total	90	100.0
078	Number of Service Applications Performed by Computer		
	1 to 5	23	25.6
	6 or more	6	6.6
	Not applicable	61	67.8
	Total	90	100.0

SPECIAL CODES FOR Q.10

010A	Size of Innovation (Number of On-line Terminals, Police Computer		
	0-20	5	38.5
	21-40	5	38.5
	40 or more	3	23.1
	Total	13	100.0
010B	Size of Innovation (Number of MICU Vehicles)		
	2	3	18.8
	3	4	25.0
	4	1	6.3
	5	3	18.8
	6 or more	5	31.1
	Total	16	100.0
010C	Size of Innovation (Number of On-line Terminals, CAI)		
	0-20	4	25.2
	21-40	5	31.5
	40 or more	4	25.2
	No response	3	18.
	Total	16	100.0
010D	Size of Innovation (Number of Television Receivers, CCTV)		
	0-50	5	35.8
	51-999	4	28.5
	1,000 or more	4	28.5
	No response	1	7.1
	Total	14	100.0
010E	Size of Innovation (Number of Jet-Axes Ever Detonated)		
	None	6	40.0
	0-10	5	33.3
	11 or more	4	26.8
	Total	15	100.0
010F	Size of Innovation (Number of Officers Trained as Breath Testing Operators)		
	0-30	6	37.5
	31-60	6	37.5
	61 or more	4	25.0
	Total	16	100.0

Appendix E

REVIEW OF FOUR TRADITIONAL APPROACHES FOR STUDYING BUREAUCRATIC INNOVATION

This appendix summarizes much of the literature on bureaucratic innovation. Its main purpose is to show that the study of innovations is still dominated by four different approaches:[1] Research, Develoment and Diffusion, Social Interaction, Innovative Organizations, and Organizational Change. Although these approaches have become modified, and although specific studies may combine two or more of them, current empirical research on local services, as illustrated by the studies cited in Chapter I of the text (see Table E-1), still tends to follow one of these approaches. In general, the review shows that, of the four approaches, only Organizational Change provides even rudimentary assistance for analyzing innovation life histories.

Research, Development and Diffusion. The R,D&D approach views the innovative process from a multi-institutional viewpoint, covering the macro system that produces, markets, and implements new technology. The three (R,D&D) steps are the conduct of basic research (the research component), the development of specific innovations that can be applied to service problems (the development component), and the communication of such innovations to potential users (the diffusion component). The approach also includes the final installation and implementation of an innovation (adoption). For local services, the approach has been best articulated in education, following the work of David Clark and Egon Guba (Clark and Guba, 1965; and Guba, 1968). According to one observer, the major federal initiatives in education were in fact undertaken on the basis of this approach (House, 1974). Table E-2 provides a schematic chart of the various steps and the components for each of them.

Another version of the R,D&D approach may be found in the work on technology delivery systems (Wenk, 1970; Committee on Public Engineering Policy, 1973; and Ezra, 1975). A technology delivery system (TDS) is seen as that system which is composed of the various institutions that produce innovations and influence the innovative process. Thus, the TDS framework makes explicit some of the actors that are usually implicitly assumed within the R,D&D approach, including lending institutions, private manufacturers, regulatory commissions and, wherever relevant, the role of the federal government.

This R,D&D approach has been the basic framework within which many studies of local service innovations have been conducted. Studies of the development of new police equipment, for instance, have attempted to identify the institutional problems that occur in producing and implementing change in law enforcement agencies (e.g., Radnor, 1975). A major problem revealed by such studies is the

[1] Ronald Havelock (1969) has done an excellent job of reviewing the work for three of these approaches (all but the Innovative Organizations approach). He uses the label "problem-solving" in referring to the organizational change approach. This author has previously described these same approaches, but mainly in the context of problems of adoption and implementation, and not routinization. See Yin (1976) and Yin, Heald, and Vogel (1977).

Table E-1

Recent Empirical Research Illustrating Four Approaches to the Study of Innovation

Approach	Studies Reviewed
R,D&D	Radnor (1975) Baer et al. (1976)
Social Interaction	Feller, Menzel, and Kozak (1976)
Innovative Organizations	Bingham (1976) Nelson and Sieber (1976) Danziger and Dutton (1976)
Organizational Change	Bale (1976) Berman and McLaughlin (1977)

difficulty that private manufacturers encounter in dealing with the fragmented market represented by local services. Because of the fragmented market, consumer needs are more difficult to assess and potential products are more difficult to market. A second example comes from a recent study on the curriculum changes in the educational system that followed the post-Sputnik surge of interest in science education (Quick, 1978). The study identified the key role of two institutions in the education TDS that had previously been overlooked: (1) the publishing companies that produce new textbooks, and (2) state adoption boards that decide which textbooks will be used in the various schools.

The macro view of the innovative process has been very useful in calling attention to all the institutions that must interrelate and whose activities must in some way be coordinated, whether through market or administrative mechanisms. In most studies of innovation, all the relevant institutional relationships have generally not been elaborated, so the approach serves as a reminder that such relationships need to be explicitly identified. Furthermore, the incentives by which the various institutions operate do not necessarily coincide and may help to explain difficulties in the innovative process. The R,D&D approach suffers, however, from a perspective that is biased toward the environment external to the innovating organization. As such, the approach typically gives greater attention to the production and diffusion of new R&D products in the marketplace than to conditions within the innovating organization; it considers the progression from research to development to diffusion to be a linear process; and it assumes that innovations with the exact same form have general applicability to several if not many different local sites. These and other implicit assumptions have been consistently pointed out by those concerned with the dynamics of change as an innovation is actually implemented in an organization. Such critics suggest, for instance, that a more relevant approach for local service organizations would begin with a better understanding of the service practitioner's routine activities and constraints (e.g., House, 1974; Pincus, 1974; Berman and McLaughlin, 1974; and Warner, 1974).

As a macro view, the R,D&D approach thus tends to skim lightly over the critical events within a given institution. This means that there is only very superficial concern for a process such as routinization. Although the R,D&D approach may provide a general context for understanding the place of routinization in the overall

Table E-2

The Research, Development, and Diffusion Approach

	Research	Development		Diffusion		Adoption		
		Invention	Design	Dissemination	Demonstration	Trial	Installation	Institution-alization
Objective	To advance knowledge	To formulate a new solution to an operating problem or to a class of operating problems, i.e., *to innovate*	To order and to systematize the components of the invented solution; to construct an innovation package for institutional use, i.e., *to engineer*	To create widespread awareness of the invention among practitioners, i.e., *to inform*	To afford an opportunity to examine and assess operating qualities of the invention, i.e., *to build conviction*	To build familiarity with the invention and provide a basis for assessing the quality, value, fit, and utility of the invention in a particular institution, i.e., *to test*	To fit the characteristics of the invention to the characteristics of the adopting institution, i.e., *to operationalize*	To assimilate the invention as an integral and accepted component of the system, i.e., *to establish*
Criteria	Validity (internal and external)	Face validity (appropriateness) --- Estimated viability --- Impact (relative contribution)	Institutional feasibility --- Generalizability --- Performance	Intelligibility --- Fidelity --- Pervasiveness --- Impact (extent to which it affects key targets)	Credibility --- Convenience --- Evidential assessment	Adaptability --- Feasibility --- Action	Effectiveness --- Efficiency	Continuity --- Valuation --- Support
Relation to Change	Provides basis for invention	Produces the invention	Engineers and packages the invention	Informs about the invention	Builds conviction about the invention	Tries out the invention in the context of a particular situation	Operationalizes the invention for use in a specific institution	Establishes the invention as a part of an ongoing program; converts it to a "non-innovation"

SOURCE: David Clark and Egon Guba, "An Examination of Potential Change Roles in Education," Seminar on Innovation in Planning School Curricula, Airlie House, Warrenton, Va., October 1965.

innovative process, it contributes few insights into the specific decisions, procedures, and organizational behaviors that occur as a specific innovation becomes routinized at a specific site. From the point of view of understanding routinization, the relevant conceptual issues must be spelled out in greater detail at the organizational level.

Social Interaction. This approach applies to situations where individuals adopt specific innovations. The individuals may learn about these innovations from other adopters, creating a communications network through which information about the innovation and the experiences of other individuals passes. Thus, social interactions become a key element to the adoption process, which is a step included in but not emphasized by the R,D&D approach.

Much research has followed this approach, mainly in the form of studies of the *diffusion* of innovations (Rogers and Shoemaker, 1971). The set of adopters may be physicians concerned with a new drug, farmers considering new agricultural techniques, consumers concerned with birth control devices, or any number of groups of individuals for whom a particular innovation may be relevant. The research has typically found that the adoption pattern follows an S-shaped curve over time,[a] and various studies have also attempted to identify the conditions that may predict the rate of adoption. For instance, many studies have compared the characteristics of individuals who are early adopters with those who are late, while other studies have examined the characteristics of the communications network or of the innovation that may lead to rapid or slow rates of adoption. Figure E-1 provides a schematization of the adoption process, together with some of the relevant conditions that have been identified.

Because the Social Interaction approach has mainly dealt with the behavior of individuals, it has not been viewed useful in describing or explaining the innovative process for organizations. In some cases, where the organization is, for instance, a state legislature and the innovation is a new piece of legislation (e.g., Walker, 1969), the Social Interaction approach may be applied without too much difficulty. This is because the act of adoption may be seen as a unitary act, embodied in a specific vote, and because the implementation steps that follow adoption may not play an important role. However, major problems arise when the approach is applied to the implementation of new programs or other innovations by service agencies (Warner, 1974). In such cases, the decision to adopt may not be a unitary decision, and there may be no single individual that may be regarded as the adopter. Studies conducted along these lines have therefore had to arbitrarily identify an adopter, usually naming the head of the agency as the adopting individual (e.g., Mytinger, 1968). More important, the critical implementation factors in the organizational innovation process cannot be studied as a simple act of adoption.

As a result of these difficulties, there has been some attempt to redefine the Social Interaction approach so that it can be applied to organizations rather than

[a] More precisely, the logistic follows the general form:

$$P = \frac{K}{1+e^{-(a+bt)}}$$

where P is the percentage of adopters who have adopted the innovation; e is the base where the natural log (ln) = 1; K is the asymptotic value of P; a is the constant of integration locating the curve on the time scale; b is the rate of growth coefficient; and t is time.

to individuals as adopting units. Rogers and Eveland (1975), for instance, suggest that one possibility is to add an implementation stage to the original approach, making the decision to adopt merely an intervening step and hence not the main focus of study, and defining permanent changes in organizational practice as the new set of outcomes to be explained. This does not entirely solve the problem, for the major work of conceptualizing the implementation process remains incomplete. Moreover, to the extent that it is completed, the effort represents such a significant shift away from the concern with adoption that the Social Interaction approach may no longer be recognizable.

In a similar manner, the Social Interaction approach is not helpful for studying the later events that characterize the routinization process. Any understanding of routinization must cover the organizational events that take place after an innovation has already been implemented for some period of time; yet, the approach does not extend over such a period of time.

Innovative Organizations. This approach is more static than the first two because it has attempted to identify the critical characteristics of innovative organizations, without developing an explicit explanation of organizational changes over time. Clues about the innovative process are thus inferred from the characteristics that have been found to be shared by innovative organizations but no direct attempt is made to test hypotheses about the process itself.[3] Tannon and Rogers (1975), for instance, reviewed eight major studies of innovations in health care systems, with all studies attempting to arrive at a definitive set of characteristics of innovative organizations.

Another example of the Innovative Organizations approach is represented by the research of Burns and Stalker (1961) on the distinction between mechanistic and organic organizations. Mechanistic organizations are defined as highly differentiated, formalized, hierarchical, and inward directed, and are not seen as innovative organizations. Organic organizations are mainly defined in terms of the opposing attributes, and are therefore more innovative. In a similar manner, there have been several reviews of the literature in which the characteristics of innovative versus noninnovative organizations have been compared (e.g., Becker and Whisler, 1967; Rowe and Boise, 1973 and 1974; Rothman, 1974; and Public Affairs Counseling, 1976). No dominant set of characteristics has emerged from these reviews. Moreover, even if a consistent set of organizational attributes were found, little would be learned about the innovative process (i.e., how an organization innovates) other than by inferring change processes from clusters of static characteristics (Rogers and Agarwala-Rogers, 1976).

This approach encounters another difficulty when actual data from organizational cases are analyzed. The data are usually aggregated in some manner, so that innovative organizations are defined by some aggregate index (e.g., based on the number of innovations that have occurred in the organizations), and the entire analysis is conducted at an aggregate level—which may be inappropriate because the results are averaged over a heterogeneous group of organizations and innovations (Downs and Mohr, 1976). In other words, different research studies will use different groups of innovations in defining innovativeness; therefore, the identification of key organizational characteristics does not apply to a specific innovation, but

[3] An excellent critique of this approach appears in Eveland, Rogers, and Klepper (1976).

to a mixed group of innovations. As Downs and Mohr (1976) point out, it is not surprising that, because the mixed group varies from study to study, there has been little consistency in the findings of these studies as to the key organizational characteristics.

The Innovative Organizations approach may nevertheless provide a possible starting point for studying implementation and routinization. For instance, Yin (1977) hypothesized two innovative processes within local service agencies. One process was associated with production efficiency and resulted in service improvements; the other was associated with the fulfillment of bureaucratic self-interests such as agency growth and prestige and resulted in incorporation. The findings of the study suggested that, although certain conditions such as practitioner training promote both service improvement and incorporation, other characteristics of the situation—e.g., support for the innovation by the chief executive of the jurisdiction and initiative from a coalition of individuals within the innovating agency—were important to incorporation but not service improvement; other characteristics were important to service improvement but not incorporation. The overall conclusion was that local agencies often incorporate innovations such as computer systems that serve bureaucratic self-interests, even though no service improvements are clearly evident. Conversely, innovations that lead to service improvements may not be incorporated unless they also serve some bureaucratic self-interest.

Despite the apparent utility of research that has followed the Innovative Organizations approach, the approach can only provide indirect clues about the underlying processes. The clues must then be pursued by some systematic hypothesis testing about the important causal changes over time, and care must be taken in the design of any study to avoid aggregating an overly heterogeneous set of experiences. Because this hypothesis-testing stage has rarely taken place, it is difficult to assess the ultimate utility of the Innovative Organizations approach. Judged by its present use, however, it falls short of providing an adequate conceptual framework for studying the routinization process.

Organizational Change. This fourth approach provides what is probably the most useful context for analyzing the routinization process. In essence, the approach focuses on events within an organization as it undergoes change, and the innovation process is seen as but one variant of organizational change. The process has not really been defined in great detail but there are usually four stages that have been identified:

- *Prior state* of the organization before change, in which dissatisfaction or a sense of opportunity may arise and there is a recognition of the need for change.
- *Initiation*, or the process of planning for specific changes and identifying the resources to be used and procedures to be followed.
- *Implementation*, or the actual occurrence of change when the plan becomes a reality, and during which unanticipated responses may occur.
- *Routinization*, or the establishment of the new changes as a stable and normal part of organizational procedures and behavior.

This same basic conceptual framework has been applied in numerous studies of both public and private organizations. Table E-3 is an adaptation of a table originally developed by Hage and Aiken (1970) and indicates the different labels that

Table E-3

Variations in Organizational Change Approach[a]

Hage and Aiken (1970)	Mann and Neff (1961)	Barnes (1971)	Berman and McLaughlin (1974)
Evaluation	State of organization before change Recognition of need for change	-	-
Initiation	Planning change	Unfreeze	Initiation
Implementation	Taking steps to make change	Change	Implementation (mutual adaptation is necessary)
Routinization	Stabilizing change	Refreeze	Incorporation

[a]See text for explanation of terms.

have been applied, even though the conceptualizations are similar. For instance, the systems dynamics and equilibrium theory espoused by Kurt Lewin provides the labels "unfreezing," "change," and "refreezing" in reference to the final three stages (Lewin, 1958; Barnes, 1971; and Alderfer, 1976), whereas the organizational theory developed by Berman and McLaughlin (1974) uses the terms "initiation," "implementation," and "incorporation."

This kind of change process occurs continually in all but the most static organizations, and the general purpose of previous research has been to identify desirable innovative behavior, to reduce the barriers to change, and to promote more change-oriented organizations. In fact, the general thrust of such managerial initiatives as *planned change* or *organizational development* is based on the premise that a chronic capacity for change is a desirable state of affairs for most organizations (e.g., Bennis, Benne, and Chin, 1969). The classic studies have attempted to suggest the conditions most conducive to change, such as the existence of performance gaps (March and Simon, 1958, pp. 176, 182-184; and Downs, 1967, p. 169), slack resources (Cyert and March, 1963; and Thompson, 1969, pp. 44-45), or even bureaucratic conditions in which self-interests, the extending of career goals, and changes in organizational goals, can all lead to a constant state of change (Blau, 1955). Other studies have described the role of change agents in instigating change through training programs and other methods of attitude change among the employees of an organization (Bennis, 1965). In fact, one way of depicting organizational change is to describe it in terms of the stages of conflict between the individual proponents and opponents to a particular proposal (Watson, 1969).

One of the significant developments in the Organizational Change approach has been the increasing number of studies on implementation. This marks a shift from earlier research, which tended to focus on the conditions for initiating change, but not on the later stages of change (Bennis, 1965). Studies of the implementation process in private organizations, for instance, have received considerable impetus from those interested in operations research. This research, though primarily con-

cerned with innovations such as the use of quantitative models, now explicitly treats implementation as a behavioral process (Schultz and Slevin, 1975). Similarly, studies of organizational changes in public organizations, typically following initiatives taken by the federal government, have now begun to examine the implementation process and to compensate for the earlier gap in the literature noted by Pressman and Wildavsky (1973).

Only fragmentary work, however, has been done on the final stages of organizational change, or routinization. Hage and Aiken (1970) suggest that:

> Perhaps the best sign of the routinization of [a] new program occurs when the men who were originally involved in implementing the program are replaced. If the program remains essentially the same, . . . we can then say that it has been stabilized. Another sign of routinization is the development of job training programs for the new replacements.

In other words, if a new practice survives despite of personnel turnover, this may be one sign that the practice has become routinized. Another suggestion is that routinization will more easily follow if the changed practice is central to an agency's priorities (Berman et al., 1975). However, aside from a few suggestions such as these, there has been no comprehensive study of the routinization process. Thus, even though the Organizational Change approach provides a potential framework for analyzing the routinization process, the relevant issues have not yet been developed in detail.

Summary. This appendix has reviewed four traditional approaches for studying innovation in local services. Each of the four tends to focus on one or another aspect of the innovative process, and no single approach is all-encompassing. (Table E-4 summarizes the complementary contributions that can be expected from each approach.) A full understanding of all aspects of organizational innovation would

Table E-4

Four Approaches to the Study of Bureaucratic Innovation

Approach	Main Focus	Innovative Stage that Tends to be Subject of Study		
		Adoption	Implementation	Routinization
Research, Development and Diffusion	Institutional relationships in the production of a new technology	✓		
Social Interaction	Communication networks among individual adopters or organizations	✓		
Innovative Organizations	Characteristics of innovative organizations and their environment	✓	✓	
Organizational Change (also problem-solving approach)	Change processes and individual behavior within an organization		✓	✓

thus require some element of each approach. For the purposes of studying the routinization process, however, our argument is that the Organizational Change approach is more relevant than the other three, and hence must play the central role in any discussion of routinization. This means greater emphasis on specific change processes and behaviors within a service organization, and less emphasis—at the outset, at least—on inter-organizational patterns of communication and community characteristics across jurisdictions.

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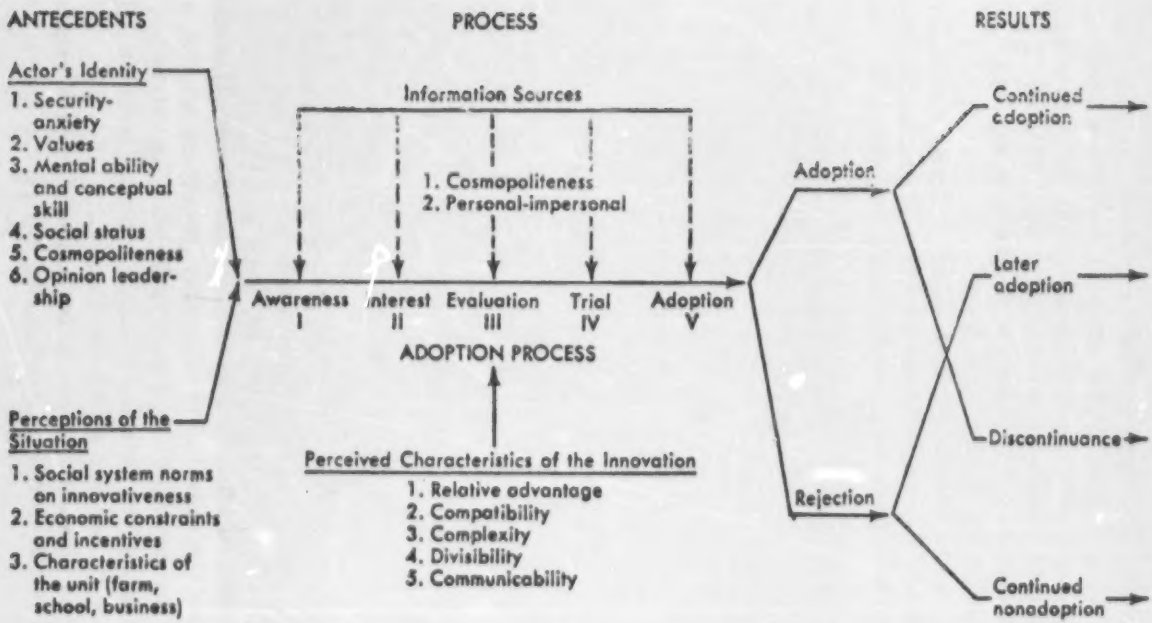

SOURCE: Everett M. Rogers, *Diffusion of Innovations*, The Free Press, New York, N.Y., 1962, p. 306.

Fig. F-1—The adoption process (social interaction approach)

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